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T. R. Elliott

DESCRIPTIVE CATALOGUE

OF THE

SPECIMENS ILLUSTRATING

SURGICAL PATHOLOGY

IN THE

MUSEUM OF UNIVERSITY COLLEGE, LONDON.

NEW EDITION.

BY

RAYMOND JOHNSON, B.S., F.R.C.S.,
SURGEON TO UNIVERSITY COLLEGE HOSPITAL,

AND

T. W. P. LAWRENCE, M.B., F.R.C.S.,
CURATOR OF THE MUSEUM.

PART II.

INJURIES AND DISEASES OF THE NEURO-MUSCULAR, VASCULAR, ALIMENTARY, AND RESPIRATORY SYSTEMS AND THE THYROID GLAND.

M19447

COPIES MAY BE OBTAINED AT THE OFFICE OF THE COLLEGE.

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END OF PART II.

SURGICAL PATHOLOGY.

PART II.

INJURIES AND DISEASES OF BURSÆ.

Hæmatoma of Bursæ.

As the result of a contusion an effusion of blood into the cavity of a bursa is not uncommon. Complete absorption usually occurs, but occasionally the extravasation is followed by suppuration or by a chronic enlargement of the bursa.

Acute Inflammation of Bursæ.

Acute inflammation often terminating rapidly in suppuration is a common result of wounds or other injuries of bursæ. This cannot be shown in Museum specimens.

Simple Chronic Inflammation of Bursæ.

This presents three forms:—

1. *Simple fluid enlargement.*—In this the wall is but little thickened, the increase in size being the result of distension of the bursa with clear serous or sometimes blood-stained fluid (1065).
2. *Chronic inflammation with thickening of the wall.*—In this form the bursa may form a tumour of considerable size, partly caused by thickening of the wall and partly by effusion of fluid into its interior. On section the thickened wall is found to be composed of layers of dense fibroid tissue, and, even though before removal the bursa feels perfectly solid, a small central cavity is always found within it (1074).
3. *Fluid enlargement with the presence of loose bodies.*—The bodies may be identical in form and structure with the "melon-seed bodies" found in joints and synovial sheaths, and, like them, are probably formed from altered blood or fibrinous deposits on the serous surface (1075). Blood-crystals are occasionally found within them. Occasionally the loose bodies are cartilaginous and rounded in form. Such bodies are only found in bursæ close to joints and in connection with rheumatoid arthritis (1076).

1065. A bursa patellæ, which has been distended and increased in size by an accumulation of fluid. The walls of the dilated bursa are slightly thickened; it is 5·5 cm. in diameter and globular in shape, although this regular form is due probably to its artificial distension. An elliptical portion of the integument is adherent to one part of the bursa, and on the opposite aspect are some bands of glistening fibrous tissue, probably part of the aponeurosis lying upon or around the patella.
5036

The bursa was removed by operation.

1066. A bursa patellæ with an elliptical portion of the integument, the bursa being enlarged so as to form an almost globular sac about 4 cm. in diameter. The wall of the sac is slightly thickened, and it appears to have been but loosely connected with the surrounding tissue; the skin on its anterior surface is thin, wrinkled, and healthy. The interior of the bursa is covered with a closely adherent, opaque, tough substance, which anteriorly is accumulated in large amount, and forms a laminated nodular mass projecting into the interior of the sac. This substance exactly resembles that composing the laminated loose bodies occurring in joints and bursæ, and is most probably fibrin derived from blood effused into the bursa.

1067. An enlarged and thickened bursa patellæ. The enlarged bursa is of a compressed oval form, slightly constricted across its middle so as to have a bilocular cavity. Its wall is about 2 mm. thick, and formed by close fibrous tissue lined with a layer of softer, semi-transparent substance, which is raised in elevations of varying size and prominence so as to render the interior uneven and coarsely granulated. 3748

The enlarged bursa had existed for thirty years on the knee of a sawyer.

1068. Part of an enlarged bursa patellæ, which measures 8·5 cm. in its longest diameter. The wall of the bursa varies in thickness from 2 to 6 mm., and is composed of dense fibrous tissue. The inner surface is in parts covered with an adherent layer of loose shreddy material. The contents of the bursa are entirely solid and consist of a firm fibrinous substance of a brownish colour, presenting an irregular striation, the lines of which are more or less concentric. The solid contents are but loosely adherent to the wall of the bursa, and closely resemble in appearance the laminated clot of an aneurism. 5673

1069. Plaster cast of the right knee from the case from which the bursa preserved in the last specimen was removed. 5673 A

From a charwoman, aged 49, in whom the swelling had existed for about 12 years; it had been aspirated about 7 years before admission. The bursa was excised. (Mr. Hill's *Case-books*, 1881, vol. ii. p. 118.)

1070. Two prepatellar bursæ removed by operation from the same person. The upper and larger of the two bursæ consists of a hemispherical cyst, measuring 5·5 cm. in diameter, and composed of a dense fibrous wall 5 mm. in thickness at its central and thinnest part. The inner surface of the bursa is covered with a layer of brownish-yellow fibrinous material, which in the upper half forms irregular projecting masses. The lower bursa measures 4 cm. in its longest diameter, and consists of a very dense, thick, fibrous wall surrounding a small lumen and lined with a thin layer of substance similar to that in the other cyst. On the posterior aspect of this bursa is another thin-walled bursal space, the inner surface of which presents large numbers of small branched and club-shaped villous processes similar to those often seen in joints. At one spot a long string-like fibrous band is attached to the inner surface of the bursa. 6638

From a woman, aged 32. The enlargement of the bursa over the left patella had been noticed for 6 years. (Surg. Reg. Rep. 1889, p. 135, No. 2383.)

1071. Two prepatellar bursæ removed by operation from the same person. Each bursa is hemispherical in shape, presenting a flattened posterior and a convex anterior surface, and having a diameter of nearly 7 cm. In the upper specimen, which has been laid open, the wall of the bursa is seen to consist of dense fibrous tissue and to have a thickness of about 6 mm. The interior of the bursa is, in its present condition, filled with a yellowish-brown sponge-like fibrinous substance. 6223

From a woman, aged 39, who for 12 years had been a laundress and previously a domestic servant. The enlargement of the bursæ had been noticed for 7 years. Both were excised. (Surg. Reg. Rep. 1886, p. 94, No. 1297.)

1072. A longitudinal section of a bursa patellæ, the wall of which has been so thickened as in places to measure more than 1 cm. The thickened wall is formed by dense interlacing bundles of fibrous tissue. The posterior wall of the bursa is flat or slightly hollowed; the anterior bulges prominently forwards. Its interior is very irregular, and filled with a tough brownish substance in which are numerous intervals, making it coarsely cancellated. 3558

The enlarged bursa was removed from the knee of a woman in whom it had been noticed for 7 years.

1073. A bursa patellæ greatly thickened by chronic inflammation. The enlarged bursa is about the size of, and nearly of the same shape as, a patella; posteriorly it is evenly concave. Its thickened wall is composed of close fibrous tissue, and its cavity is compressed and small. The interior is uneven, and small imperfectly lobulated growths project into it, the growths being formed of fibrous tissue continuous with that of the wall of the sac.

1074. The bursa from beneath the insertion of the sartorius, enlarged and much thickened, like some of those shown among the preceding specimens, the central cavity being reduced to a mere cleft. The tissues around it are thickened, indurated, and adherent. Its posterior surface is slightly concave in adaptation to the form of the parts on which it rested. 4572

From a subject brought into the dissecting-room.

1075. A bursa patellæ removed by operation. The bursa is increased in size and its wall is slightly thickened. The cavity is slightly sacculated. The inner surface of the bursa is faintly velvety and presents numerous projections as large as a pin's head. In the bottom of the bottle are a large number of melon-seed bodies which occupied the interior of the bursa.

Microscopic Structure.—The wall of the bursa consists of dense fibrous tissue, but in the situation of the small projections above described the tissue is looser and more cellular. There is no evidence of the presence of tubercle. One of the melon-seed bodies examined microscopically consists entirely of a fibrinous material.

1076. Seven out of fourteen loose bodies which were taken from the bursa between the semimembranosus muscle and the inner head of the gastrocnemius. The largest of those shown is about 20 mm. long and about 12 mm. broad; the others are slightly smaller. All of them are deeply lobed, and have for the most part very uneven, nodular, or tuberculated surfaces. They are very firm, cartilaginous-looking, and are invested with a thin glistening membrane. Of one a section has been made; it is composed of dense opaline, homogeneous cartilage, the central part of which is quite opaque, white, and soft, probably from degeneration; and the peripheral portion of the mass is marked with streaks of a similar substance. The loose bodies have most probably grown from the synovial membrane, from which they have subsequently become detached. 4320

The bursa was much enlarged, 3½ inches long, ¾ inch broad at the broadest part, of an hour-glass shape, with a constriction at the spot where the tendons ride over each other. The upper cavity contained four, the lower ten of these bodies; they communicated freely one with the other, but were otherwise quite closed. Their internal surface was quite smooth. The knee-joint seemed healthy. The loose bodies that were examined microscopically were found to consist of true cartilage, but with small cells, and with the matrix here and there fibrillated; on the outside was a thin layer of connective tissue. In some places calcareous matter had been deposited in the cartilage. The outer part of the cartilage, just beneath the connective-tissue envelope, seemed especially subject to this change. In some of the specimens the centre of the cartilage was apparently occupied by a nodule of cancellated bone.

1077. Plaster cast of the outer side of the left ankle, showing a smooth rounded swelling, 8 cm. in diameter, caused by chronic enlargement of the bursa over the external malleolus ("tailor's bursa").

From a man, aged 40, in whom a swelling over each external malleolus had been noticed for a year. The enlarged bursæ were excised. (Surg. Reg. Rep. 1881, p. 64, No. 788.)

1078. A right hip-bone together with an enlarged bursa which lay beneath the ilio-psoas muscle. The upper and longer part of the cyst, which has been distended with plaster of Paris, is ovoidal in shape, measures 6·5 cm. in length, and reaches upwards to the centre of the iliac fossa. The lower and narrower part of the cyst, which has not been artificially distended, extends downwards between the anterior inferior iliac spine and the ilio-pectineal eminence almost to the margin of the acetabulum. The wall of the bursa is thin.

From the dissecting-room.

1079. Two small, thick-walled bursæ, removed by operation from over the olecranon processes. Each bursa contains a small central cavity, which is lined with an irregular fibrinous layer. 7357

From a man, aged 42, an engine-driver. The enlarged bursæ had been present for 11 years. They were dissected out. (Mr. Heath's *Case-books*, vol. ii. 1895, p. 404.)

TUBERCULOUS DISEASE OF BURSÆ.

Tuberculous disease occurs in bursæ in two forms corresponding with the two chief varieties of tuberculous disease of the joints. In one form the bursa becomes filled with tuberculous granulation-tissue, which softens with the formation of a chronic abscess. In the other form the wall of the bursa is thickened and its cavity is distended with serous effusion containing melon-seed bodies. Bursæ communicating with joints may be affected in association with tuberculous disease beginning in the joint-cavity.

SYPHILITIC DISEASE OF BURSÆ.

Effusion of fluid into a bursa is occasionally met with during the secondary period of syphilis. Much more commonly a bursa is the seat of a gumma, which may soften and be followed by ulceration of the overlying skin. Clinically a gumma of a bursa may, before it has softened, resemble a simple fibrous thickening. Gummata are most common in the bursa patellæ (1080).

1080. Half a bursa patellæ which is the seat of a softening gumma. The vertical measurement of the bursa is 6 cm. and the antero-posterior 4 cm. The outer surface of the bursa is irregular as the result of the adhesion to it of the thickened surrounding tissues. On section the bursa is seen to be solid. In a central rounded area measuring 3 cm. across degeneration has occurred with the formation of homogeneous yellowish substance, broken up by irregular cleft-like spaces. Around this area the greatly thickened wall of the bursa presents a dense structure and is irregularly intersected with fine lines of white fibrous tissue. 7450

Microscopically, a section of the thickened bursa presents a connective tissue the interstices of which are densely infiltrated with small round cells. Extensive degeneration has occurred. Some of the vessels are blocked with small round cells and others are thrombosed.

From a married woman, aged 30. A swelling over each knee had been present for two years. On admission there was a solid enlargement of the right bursa patellæ as large as an orange; the left bursa patellæ was less enlarged, the overlying skin was reddened, and there was a sinus discharging thin purulent fluid. Both bursæ were excised. The one preserved in the specimen is from the right knee. (Surg. Reg. Rep. 1888, p. 106, No. 1733.)

INJURIES AND DISEASES OF MUSCLES, TENDONS, AND TENDON-SHEATHS.

Injuries of Muscles and Tendons.

Muscles and tendons are occasionally ruptured or torn from their attachments by muscular action. The tendon most frequently ruptured in this way is the tendo Achillis (1082). Tendons may also be torn through from external violence, or divided in wounds. When a limb is torn off, a tendon is sometimes dragged away from its attachment to its muscle, usually bringing away a small portion of the muscular substance with it (1084). A ruptured or divided tendon is repaired by dense fibrous tissue if the ends are kept within a short distance of each other.

1081. Part of the upper extremity of a right humerus together with part of the biceps muscle. The outer belly of the muscle terminates, at a distance of 10 cm. above the tendon of insertion, in a somewhat irregular truncated extremity, which is covered with a dense fibrous layer. From the fibrous layer a dense tendon-like structure 13 cm. in length is continued upwards to the bicipital groove, to both margins of which it is firmly attached; the tendon itself is absent. The edges of the bicipital groove are thickened and the articular cartilage of the humerus rendered in parts fibrous by rheumatoid arthritis.

It is probable that the condition of the muscle resulted from rupture of the outer head.

1082. A tendo Achillis with the posterior part of the os calcis. The tendon has been ruptured transversely 2·5 cm. above its place of insertion. The ruptured ends are separated by a distance of 1·5 cm., and are tapering and smoothly rounded. The tendon of the plantaris muscle is intact. 1283

From the dissecting-room.

1083. A left patella, together with the lower part of the quadriceps extensor muscle and the ligamentum patellæ. Immediately above the patella the tendon of the quadriceps is torn transversely so as to leave only a strip about 1 cm. broad attached to the middle of the upper border of the patella. The torn parts of the tendon are separated to the extent of about 1·5 cm. The cartilage of the patella shows changes resulting from rheumatoid arthritis. 5657

From a man, aged 74, who fell down three steps on to the left knee. On admission there was fluid in the knee-joint and a gap in the vastus externus, 2 fingers' breadth above the patella, allowing the finger to press on to the bone. Ice was applied, and on the 6th day one ounce of blood-stained fluid drawn from the knee. Plaster of Paris was afterwards applied. Death occurred from heart disease about a month after the accident. (Surg. Reg. Rep. 1881, p. 91, No. 377.)

1084. The terminal portion of a thumb, with the tendon of the flexor longus pollicis and some of the muscular substance. 3367

From a boy, aged 12. The parts shown were torn away in a machinery accident. There was considerable swelling of the forearm in the part from which the tendon had been torn.

1085. The terminal portion of a thumb, which was torn away in a machinery accident. The tendon of the flexor longus pollicis, with a portion of the substance of the muscle, has been drawn from the forearm, and remains fixed to the ungual phalanx, near which it is partially torn through. A portion of the digital nerve of one side, about 4 cm. in length, has also been torn away with the parts shown in the specimen. 3605

ATROPHY OF MUSCLES.

Muscles diminish in size in wasting diseases. Prolonged want of use causes a gradual diminution in size of the individual fibres, while at the same time fat accumulates in the connective tissues between the fibres. The bulk of the muscle is to a great extent kept up by this accumulation of fat. In extreme cases the muscular tissue can scarcely be recognised by the naked eye, the whole muscle resembling a mass of adipose tissue, which has, however, a somewhat fibrous appearance from the cells being arranged in lines between the wasted muscular fibres (1086). If the cause of the inactivity of the muscle be removed, this condition may be completely recovered from. This condition must be distinguished from true fatty degeneration of muscle, that is to say, conversion of the actual muscular tissue into fat granules. This change is not common in the voluntary muscles, though it is very frequent in the muscular fibres of the heart. It occurs in muscles that have long suffered from infantile paralysis, in progressive muscular atrophy, in acute phosphorus poisoning, and in the decay of old age. Locally it is seen in the immediate neighbourhood of abscesses and malignant tumours.

1086. Portion of a gastrocnemius muscle, exhibiting an advanced stage of fatty degeneration of the muscular tissue, most probably owing to disuse; the areolar and tendinous structures are unaltered in appearance. The proper tissue of the muscle has completely lost its natural hue, and is throughout of a pale yellow colour, the fascicular arrangement of its parts alone serving as an indication of the previous existence of muscular substance. 2050

1087. The lower part of a gastrocnemius muscle in which a complete conversion of the proper muscular substance into fat has taken place, the arrangement and form of the muscular fasciculi alone remaining. The tendinous structures are unaltered. 5284

From a subject brought into the dissecting-room.

1088. Part of the integument of an arm with portions of the subjacent muscles, the latter being in an advanced stage of fatty degeneration. At the lower part of the back of the specimen some muscular fibres, sharply defined, bright and not obviously altered from health, traverse the fatty mass, which has resulted from the degeneration of the rest of the muscular tissue. In the degenerated portions scarcely any trace of a fascicular arrangement exists, and the muscular fibres have probably disappeared after having undergone fatty degeneration, their place being taken by natural adipose tissue formed between them. The skin is considerably increased in thickness. The subcutaneous fat is in full amount.

From a patient in whom the arm was paralysed.

HÆMORRHAGE INTO MUSCLES.

Hæmorrhage into a muscle may be traumatic, and is then probably always associated with rupture of some of the fibres. It also occurs in scurvy (1089), and is sometimes the result of the spontaneous rupture of a muscle, caused by the hyaline degeneration which is met with in typhoid fever and other febrile conditions (1091). Also in Haemophilia

1089. A narrow strip of skin, with a slice of the subjacent muscles, illustrating the hæmorrhages which occur in the subcutaneous tissue and intermuscular planes in scurvy. Upon that surface of the muscular tissue which is beneath the subcutaneous fascia there is a pale brownish coagulum, which forms a layer in the lower part of the specimen about 2 mm. in thickness; at the upper part the coagulum is much thicker, and lies on the surface of the tendinous structures from which the muscular fibres arise. Situated about 1 cm. more deeply, and apparently between the opposed surfaces of two separate muscles, is a second layer of coagulated blood, about 3 mm. in thickness. 1365

From a sailor who suffered severely from scurvy.

1090. Portion of some large muscle in which blood has been effused as a result of scurvy. No muscular fibres are discernible in the coagulum, but the margin of the effusion is, in parts, irregular, as though the effused blood had passed for a short way between the fasciculi. In the central portion of the clot are scattered blackish-brown points, probably collections of hæmatoidin. 1341

From a sailor who suffered from scurvy.

1091. Part of a rectus abdominis muscle into which an extensive extravasation of blood has occurred. The sheath has been in part reflected from the anterior surface of the muscle in order to expose a thin layer of blood superficial to the muscular tissue. The section through the muscle exposes another deeply-seated extravasation in the substance of the muscular tissue. The extravasation, which measures 2 by 3·5 cm., forms a prominent bulging on the posterior surface of the muscle, but is separated from the anterior surface by a layer of unaltered muscular tissue. 6426

From a man, aged 42, who was admitted into U. C. H. under the care of Dr. Roberts in November 1888, on the 12th day of typhoid fever. Death occurred 13 days after admission, in the typhoid state. There were hæmorrhages into one of the rectus muscles and into other parts of the abdominal wall. (Medical *Case-books*, vol. 387, p. 292.)

ACUTE INFLAMMATION OF MUSCLES.

Acute myositis is rare, if we exclude the inflammation of muscular tissue which may occur in the neighbourhood of foci of acute suppuration. It is sometimes met with as a manifestation of acute rheumatism, and is an occasional complication of the acute infective diseases. Pyæmic abcesses sometimes occur in the muscles.

1092. The left biceps muscle from a case of glanders. Close beneath the anterior surface of the outer belly, and slightly above its middle, is an elliptical abscess-cavity measuring about 3·5 cm. in length.

From a man, aged 23, a coal-heaver, who was admitted into U. C. H., under the care of Dr. Poore, March 24, 1890. On March 17 patient took to his bed on account of weakness and shooting pains all over the body. On March 19 there was cough with slight pain in the left side of the chest, shortness of breath, and loss of appetite; the tongue was dry and furred. Two horses in his employer's stables had recently died—one died from "blood-poisoning," and the other was killed for "farcy." The patient's most prominent symptoms were high fever (103°-105°), severe pains in the limbs, tender inflammatory nodules, chiefly in the upper and lower limbs, a subcutaneous abscess on the posterior aspect of the right arm, papules and pustules on the face, with erysipelatous swelling, especially of the left cheek. There was excoriation of the anterior nares and a purulent discharge from the right nostril; friction was present in the left side of the chest. Patient became delirious and passed into a typhoid state, death occurring on the seventh day after admission.

P.M.—Fluid and recent lymph in left pleural cavity, small hard nodules as large as peas beneath visceral pleura of both lungs, and numerous subpleural petechiæ; each nodule was soft and yellow in the centre, and surrounded with a dark hæmorrhagic zone. There were subpericardial petechiæ, but no pericarditis. There were two small nodules beneath the mucous membrane of the intestine, one in the duodenum and the other in the lower ileum. There was commencing ulceration in the upper part of the large intestine. The spleen and kidneys were normal. The subcutaneous nodules were all situated in the superficial part of the muscles. There was excess of turbid fluid containing pus-cells in both knee-joints. The brain was healthy. There was sloughy ulceration of the palate as well as of the nasal cavity and the posterior surface of the epiglottis. Glanders bacilli were present in the pus of the abscesses and in the fluid of the knee-joints. The pure culture obtained on potatoe had the appearance of half-melted yellow butter. (Dr. Poore's *Case-books*, 1890, Males, vol. i. p. 165.)

Ossification of Muscles and Tendons.

Localized formations of bone in the substance of a muscle or tendon are not very uncommon, and sometimes result from frequently repeated slight injuries. The bony mass may be unattached (1095) or may appear as an outgrowth from a bone in the substance of a tendon (1099).

A more diffuse formation of bone in the muscles is occasionally met with, constituting the rare condition known as *myositis ossificans.* The deposit of bone in these cases usually occurs in the first instance in some of the muscles of the back, but in the later stages of the disease many of the muscles of the trunk and limbs may be affected. The ossification takes place in the interstitial tissue of the muscle, and appears to be the result of an inflammatory process the causation of which is not understood.

1093. An irregular plate of bone, measuring 4·5 cm. in length, removed by operation from the substance of the brachialis anticus muscle. One border of the plate is straight, whilst the opposite border is irregular and marked at its upper end by two sharply pointed processes. At its lower extremity the plate of bone terminates in two stout facetted processes, which articulated with the coronoid process of the ulna and the humerus. 6694

From a man, aged 58, in whom a hard lump in front of the left elbow-joint had been noticed for 8 months. It slowly increased in size, and caused pain and interference with flexion of the joint. (Surg. Reg. Rep. 1891, p. 175.)

1094. The pubic portion of a pelvis. Springing from the back of the body of the right pubic bone is an irregular ridged and pointed mass of osseous substance, which has grown half round the lower end of the rectus muscle, and stands 2·5 cm. above the upper border of the bone. 3227

1095. A thin fusiform plate of bone, 10·5 cm. in length, removed from the adductor muscles of the thigh. 5438

From the dissecting-room. The bone was unconnected with the femur.

1096. A right clavicle, from the anterior border of which, nearly 2 cm. from its acromial end, a flattened, pointed process of bone has grown into the deltoid muscle; in structure it is every way similar to the adjoining part of the clavicle itself. 3072

1097. A left humerus, upon the outer surface of which, near its middle, is a low involuted ledge of bone, placed obliquely across the length of the shaft, and corresponding with the lower limit of the insertion of the deltoid muscle. 2979

1098. The upper end of a right femur. From the upper margin of the great trochanter there has grown out, probably into the substance of the gluteus medius, an irregular, pyramidal, bony mass, the apex of which slightly overtops the head of the bone. 3187

1099. The upper third of a right femur, upon the front and lower part of the small trochanter of which, and pointing directly forwards, is a long tapering bony outgrowth, formed in the ilio-psoas muscle. 5002

1100. A right femur, in which there is attached to the lower part of the linea aspera a prominent plate-like outgrowth of bone, 2·5 cm. in length along its base, and formed in the tendinous and muscular planes affixed to it. 1218

1101. A right femur in which a plate of bone very similar to that in the preceding specimen springs from the linea aspera above the middle of its length. 1218

Tuberculous Disease of Muscles.

Primary tuberculous disease of muscle is very rarely met with, and in nearly all instances in which a chronic tuberculous abscess occupies the substance of a muscle the primary tuberculous focus is in an adjacent bone. Thus one of the commonest examples of tuberculous abscess of a muscle is the psoas abscess resulting from tuberculous disease of the spinal column (495).

Syphilitic Disease of Muscles.

In the later stages of syphilis the muscles, like many other organs, may be the seat of a diffuse interstitial inflammation causing sclerosis of the muscle, or of a localized gumma (1102). Of these two conditions the latter is by far the more common, and in fact a gumma is more common than any other form of neoplasm found in muscular tissue. A gumma of muscle not unfrequently involves not only the muscular or tendinous tissue, but also the periosteum at the seat of attachment.

1102. Part of the inner half of a right gastrocnemius muscle. The vertical section passes through the middle of a gumma in the substance of the muscle. The gumma had the size and shape of a small patella, and involves the whole thickness of the fleshy part of the muscle, the thick aponeurosis on the anterior surface being unaffected. The gumma produces a distinct swelling on the superficial surface of the muscle; its upper and lower limits are fairly well defined, and the adjacent muscular fibres are seen to be intimately connected with it. The cut surface of the gumma presents a structureless yellowish appearance, with small areas of softening.

From a man, aged 38, who was admitted into U. C. H., under the care of Mr. Berkeley Hill, in December 1888. He had syphilis 16 years previously. He was admitted into the Hospital for the treatment of urethral fistulæ. A few weeks after admission an attack of vomiting with severe abdominal pain occurred, and the patient died collapsed. The peritoneum contained 2 pints of blood-stained fluid, and behind the stomach there was a large cavity lined with adherent decolorized clot and containing fluid and coagulated blood. The source of the hæmorrhage could not be found. The liver contained large numbers of gummata, and is preserved in the Medical Series. (Surg. Reg. Rep. 1888, p. 15, No. 2339.)

Tumours of Muscles.

Primary tumours of muscle are rare and are necessarily of the connective-tissue type. Among the simple tumours of muscles are fibroma (1103), enchondroma (1106), angioma (1105), and lipoma. The only malignant tumour occurring primarily in the muscles is sarcoma, usually of the round-cell or spindle-cell variety (1109, 1110).

The direct invasion of muscular tissue by a malignant growth, sarcomatous or carcinomatous, beginning in the neighbourhood is not uncommon; as examples may be mentioned the invasion of the pectoral muscles by a carcinoma of the breast and of the thigh-muscles by a sarcoma of the femur. On the other hand, secondary deposits of sarcoma or carcinoma in the muscles are rare.

1103. Portion of some large muscle, seated on the surface of which there is a small flattened oval mass of earthy matter or bone, formed probably as the result of calcification or ossification of a small fibrous tumour. 3834

1104. Portion of some muscle in the sheath of which is a small flattened mass of calcareous substance; it is unconnected with the muscle itself. 3839

1105. A cavernous nævus removed from the semimembranosus muscle. The tumour has been laid open by an incision through its middle. It is oval in form and measures 6 cm. by 4 cm. It is completely surrounded by the fibres of the muscle in which it is situated. The outline of the tumour is clearly defined, but there is no distinct capsule and the growth cannot be separated from the muscular fibres. The section shows a beautiful cavernous structure resembling that of the corpus cavernosum penis, but the meshwork is somewhat coarser. The spaces freely communicate like those of a sponge and are lined by a smooth membrane. 3369

1106. An enchondromatous tumour, removed from the vastus externus muscle. The tumour approaches to an oval form, and is about 5 cm. long and 3 cm. in breadth; its surface is uneven and nodulated. The growth is composed of firm opaline cartilage, abundantly traversed by curling lines of glistening fibrous tissue. In several spots nodules of bone, with well-marked cancellous spaces, have been formed; some of these lie immediately beneath the surface, others in the central part of the mass. In the upper part of the tumour is a flattened irregular cavity, due apparently to softening of a portion of the growth; the walls of this space are soft and shreddy. 3729

From a boy, 15 years of age, in whom the tumour was first noticed two months after a blow. When admitted to the hospital under the care of Mr. Liston, about three years after the injury, the tumour was as large as an orange, and situated in the extensor muscle two or three fingers' breadth above the right patella. It was quite movable, slipping beneath the vastus externus when the knee was bent, and ascending when the limb was straightened.

On an incision being made over the tumour in the direction of the fibres of the vastus externus the growth was readily removed, being attached only by a small pedicle and some vessels.

1107. Portion of the pronator radii teres muscle, in connection with which a small oval tumour has grown. The tumour is but loosely connected with the parts in which it lies, and is composed of a firm almost homogeneous substance. 412

Microscopic Structure.—The specimen is a fibro-sarcoma. It consists of fibrous tissue containing collections of small round cells.

The specimen was obtained from the dissecting-room.

1108. A right scapula in vertical section and the outer part of the clavicle, together with the neighbouring muscles, and a large tumour invading them. Superiorly the tumour forms a large mass projecting upwards behind the clavicle for a distance of 6 cm. above the superior border of the scapula; posteriorly the growth extends downwards to within 2 cm. of the spine; internally it is limited by a line continuing upwards the vertebral border; anteriorly the growth extends downwards as far as the inferior angle of the scapula; externally it appears as a prominent mass beneath the clavicle and extending in front of and below the glenoid cavity, and along the whole length of the axillary border; in a deep groove on this part of the growth the dorsal scapular artery winds backwards. The tumour is firm in texture and its surface is, in parts, smooth and lobulated. The section of the specimen shows that in its upper part the growth involves the substance of the supraspinatus and subscapularis muscles, being continuous over the upper border of the scapula, the outline of which, however, appears to be normal. From this upper mass of the growth a thin layer is continued downwards on the surface of the subscapularis and is continuous with a mass of growth, 1·5 cm. in thickness, lying on the ventral surface of the inferior angle. The other muscles involved are the serratus magnus, the latissimus dorsi, teres major, and the levator anguli scapulæ. The clavicle and the shoulder-joint are unaffected. The cut surface of the tumour itself shows it to be composed largely of wavy intersecting bundles of dense fibrous tissue.

Microscopic Structure.—The tumour is a fibro-sarcoma, and consists of wavy bundles of fibrous tissue mixed with intersecting fasciculi of spindle-shaped cells. The blood-vessels are small and scanty.

From a man, aged 22, who was under the care of Mr. Heath in April 1877, when a tumour was removed from the front of the right shoulder; it involved the pectoralis major muscle. The disease recurred about the scapula, which was removed in February 1879. The patient died 36 hours after the operation.

1109. A section of the calf-muscles, together with a sarcoma growing in the substance of the gastrocnemius. The tumour forms an oval mass, 13 cm. in length and 6 cm. from before back at its centre. In its lower part the tumour is limited on its deep surface by the aponeurosis of the deep surface of the gastrocnemius, part of the muscular substance of which still remains at the upper part of the growth. The superficial surface of the tumour is, in parts, still covered by the fibrous sheath of the muscle, but in other parts it has extended beyond the limits of the muscle into the surrounding fat. The tumour is composed of a soft friable substance, intersected with delicate bands of connective tissue. The cut surface presents a mottled appearance, resulting from extravasation of blood into the substance of the growth. 8257

Microscopic Structure.—The growth is a small round-cell sarcoma.

From a girl, aged 15, who noticed a lump in the calf of the right leg before Christmas, 1897. In February 1898 a tumour as large as a plover's egg was removed with some of the surrounding muscle from the gastrocnemius. At the beginning of April the whole calf began to swell rapidly, and when the patient was admitted into U. C. H. on April 20 there was a very extensive recurrent growth. Amputation was performed by Mr. Raymond Johnson through the lower third of the thigh. On September 12 the patient was suffering from shortness of breath, and the temperature was 102°. The left side of the chest was dull throughout, and two pints of blood-stained fluid were removed by aspiration. (Mr. Godlee's *Case-books*, 1898, vol. ii. p. 264.)

1110. A left temporal muscle, together with part of the malar bone and zygomatic process of the temporal bone, removed by operation. The outer surface of the muscle, covered by the temporal fascia, shows no sign of disease. The deep part of the muscle is the seat of a tumour which is infiltrating the muscular tissue, the fibres of which can be readily traced in the tumour on the surface of the section. On one surface of the section which has been made into the tumour two small areas of dark pigmentation are seen. 7520

Microscopic Structure.—The growth infiltrates the muscular tissue. It consists of closely packed tubular spaces in many parts convoluted and filled with small spheroidal cells. In some of the spaces a distinct lumen is present, and the cells are arranged concentrically in several layers. The structure is that of an endothelioma.

The tumour was removed by Mr. Horsley from a man, aged 60. It was of 6 or 8 months' growth. The patient died insane 2½ years after the operation. There was no evidence of local recurrence. No *post mortem* examination was made.

PARASITES IN MUSCLES.

Three forms of parasites are found in the muscles of the human subject:—(1) Cysticercus cellulosæ; (2) Echinococcus; and (3) Trichina spiralis.

Cysticercus cellulosæ is rare in the human subject. It is the hydatid form of Tænia solium; it presents to the naked eye the appearance of a small transparent bladder "varying in size from that of a pea to that of a small kidney-bean" (Cobbold). The cysticercus is surrounded by a delicate cyst of fibrous tissue (1111).

Echinococcus (the ordinary "Hydatid Cyst") is occasionally found in the intermuscular spaces. It is the hydatid form of the Tænia Echinococcus. It forms a cyst sometimes reaching the size of a fœtal head. The wall of the true cyst is composed of delicate layers of a soft hyaline substance. It is surrounded by a fibrous vascular cyst derived from the areolar tissue of the part. Its contents are clear and transparent, and floating free inside are usually numerous secondary cysts varying in size from a pea to a walnut (1112).

Trichina spiralis is peculiar to the muscles. It appears as small, opaque, hard spots, oval in form, the long axis of the oval being parallel to the muscular fibres. Microscopic examination shows that each small dot is due to the presence of a minute worm coiled up in a cyst, the wall of which has become impregnated with lime-salts. The trichina enters the body through the intestine in consequence of the individual eating pork containing the parasite. The worms multiply in the intestines, and afterwards perforate the walls of the gut and find their way to the voluntary muscles, where they become encysted, as seen in the specimens. Serious symptoms occur during the passage of the worms from the bowel to the muscles; but if the patient survive this stage of the disease he recovers perfectly. In the encysted stage the parasite is harmless (1114).

Cysts are not calcified & visible in pig muscle

1111. A portion of muscle in which is situated a *Cysticercus cellulosæ*. The adventitious cyst, which consists of delicate fibrous tissue surrounding the parasite, has been laid open; it is oval in shape and measures 18 by 12 mm. Within this lies the parasitic cyst itself; it has been laid open, and consists of an extremely delicate transparent membrane, which is partly folded upon itself. Within the upper part of the parasitic cyst is seen the tænia head, which is formed as an invagination in the cyst wall. 2670

The specimen, which was presented by Dr. Sharpey, was examined by Dr. Cobbold.

1112. A hydatid cyst removed from the biceps muscle. The cyst, which has been everted, appears to have measured about 4 cm. in diameter, and has a thin, yet tough, connective-tissue wall. Its interior is smooth, but in places marked with streaks and patches of opaque brownish yellow. 5052

1113. A hydatid cyst, which was removed from the muscles of the back of the neck in which it lay encapsuled. In the empty state it measures about 8 cm. in diameter. Its wall is formed by a structureless semitransparent substance, like coagulated albumen, and readily separable into layers. The wall is in great part opaque and white, perhaps from commencing degeneration. 5207

From a lad, 18 years of age. Suppuration had taken place in the cyst; the surrounding muscular tissue was much condensed and infiltrated with gelatinous matter; no hydatid remains were found in this part, however, and the changes appeared to be merely the result of inflammation. (Sir J. Erichsen's *Case-books*, Males, Jan. 1866.)

1114. Portions of the sterno-hyoid and digastric muscles, in the fibres of which, and lying parallel with them, are numerous minute fusiform, opaque, white bodies formed by the capsules enclosing *Trichinæ spirales*. The bodies are of almost uniform size, and about half a millimetre in length.

From a dissecting-room subject. All the muscles of the body were similarly affected. The disease was not recognized during life.

1115. Part of a biceps muscle, within the substance of which are very large numbers of minute fusiform bodies exactly similar to those in the last specimen; they are the capsules enclosing *Trichinæ spirales*. 7384

From a woman, aged 39, who for 3 years had suffered from attacks of vomiting, with gradual emaciation. On admission into U. C. H. she was suffering from abdominal pain in the region of the umbilicus; the stomach was dilated; the vomit and the motions contained altered blood. Death occurred on the 8th day. There was an infiltrating growth in the pyloric end of the stomach, and the lymphatic glands in the neighbourhood were enlarged. Trichinæ were found in large numbers in the muscles, especially those of the upper limbs and thoracic wall. (Dr. Bastian's *Case-books*, Females, 1895, p. 295.)

The stomach is preserved in the Medical Series.

DISEASES OF TENDON-SHEATHS.

Acute Tenosynovitis.—Simple acute inflammation of a tendon-sheath may result from over-use of a part or may be a manifestation of acute rheumatism. Acute suppuration may follow infection of the sheath from a septic wound or neighbouring focus of suppuration; it sometimes results in sloughing of the tendon.

Chronic Tenosynovitis is most commonly tuberculous. It occurs in two forms: in one the sheath becomes distended with tuberculous granulation-tissue, which usually results in a chronic abscess; in the other form the thickened sheath is distended with fluid containing melon-seed bodies. The latter variety is most common in the sheath of the flexor tendons beneath the anterior annular ligament of the wrist (1118, 1119).

1116. Pieces of three tendons injected, the sheaths of which have been inflamed. In each the vessels of the sheaths are more evident than natural, and the connective tissue forming the sheath is opaque, thickened, and solid from inflammatory effusion into it, so as to render the tendons in the uninjected parts white and lustreless. From the lower end of the middle of the pieces the thickened sheath has been removed so as to expose the tendon itself, the fibres of which are distinct and unaltered in appearance. 396

1117. A right hand, together with the lower part of the forearm, dissected. The distended sheaths of the flexor tendons beneath the anterior annular ligament have been injected with plaster of Paris. The distended sheath of the flexors of the fingers projects forwards between the inner and outer tendons of the flexor sublimis, and extends 4 cm. above the upper border of the anterior annular ligament, appearing on the inner side between the profundus digitorum and the ulna. Below the annular ligament the injected sheath extends into the palm for a distance of 2 cm. The separate sheath of the flexor longus pollicis has also been distended. It appears between the tendons of the flexor carpi radialis and the flexor sublimis digitorum, and has the median nerve lying on its anterior surface. At the lower border of the annular ligament the tendon of the flexor longus pollicis has been divided in order to expose the prolongation of its sheath on to the thumb; this part of the sheath also is distended and thickened, and its inner surface covered with inflammatory exudation. The sheaths of the flexor tendons of the four inner digits have also been opened; that of the ring-finger is lined with a brownish layer of inflammatory exudation or granulation tissue.

1118. A collection of loose bodies from the synovial sheath in front of the wrist. They are of various forms, some regularly oval, but most of them variously flattened and polyhedral; the largest is about 1 cm. in its longest measurement. They are of a dull buff colour, and formed of a friable homogeneous material. Some have been broken into layers, and it is probable that they have all a laminated construction. Microscopically they are composed of a closely felted basis substance through which are scattered brownish-yellow crystals of hæmatoidin, and are evidently formed by effused blood. 3291

The bodies were removed from one of the tendon-sheaths of the wrist of a woman. Five years previously numerous small granular bodies and much glairy fluid had been discharged from the sheath of the tendons of the thumb. The disease was probably tuberculous.

1119. A collection of loose bodies from the synovial sheath in front of the wrist. They are mostly of a compressed oval or less regular form, the larger of them averaging about 5 mm. in their greatest measurement. 3292

From a coach-driver. "A very violent inflammatory action" followed the removal of the bodies. "Numerous abscesses formed in the hand and forearm; the thumb was saved with difficulty."

1120. An irregularly lobulated cartilaginous tumour, 2·5 cm. in its greatest diameter. On section the tumour is seen to consist of mutually adapted lobules bound together by a distinct fibrous capsule. 6646

Microscopic Structure.—The growth consists of cartilage, the matrix of which is in part fibrillated. The tumour was removed by Mr. Beck from the flexor tendon-sheath of the index finger of a young woman. It occupied the upper part of the sheath in the palm, and before the operation was regarded as a ganglion.

GANGLION.

A ganglion is a cyst containing thin jelly-like material and situated in close connection with a tendon-sheath or joint, although not directly communicating with the synovial cavity. Ganglia are most common about the wrist, especially on the dorsal aspect of the outer half; they are also not uncommon on the dorsum of the foot (1121). Their exact mode of origin is uncertain.

1121. A lens-shaped thin-walled cyst, about 3·5 cm. in diameter, from over the extensor tendons of the foot, and which may have once communicated with their synovial sheath, although there is now no appearance of such a communication having existed. One of its surfaces is less convex than the other. 2361

1122. Plaster cast of a right foot, on the dorsum of which is a hemispherical swelling caused by a ganglion. 6881

INJURIES AND DISEASES OF NERVES.

INJURIES.

When a nerve is divided or torn across, its ends become separated from each other for a short distance by retraction. After a few days they become swollen, and a soft reparative material, composed of elongated cells, is formed between them. If the distance between the divided ends be not too great, the nerve may finally be completely restored, the injured part being permanently indicated by a slight fusiform swelling (1123). In an amputation-stump the ends of the divided nerves always assume a more or less bulbous form, in some cases giving rise to distinct rounded tumours, which may readily be felt during life (1127). These may be painless; but when of great size, and especially when implicated in the superficial part of the cicatrix, they are acutely painful, and may require removal by operation. These tumours are spoken of as "bulbous nerves," or "amputation-neuromata." They are composed of fibrous tissue, intermingled with numerous nerve-fibrils of new formation, irregularly twisted and matted together.

1123. Portions of the nerves of a brachial plexus which have been injured some time (probably many weeks) before death. The trunks are surrounded by cicatricial fibrous tissue; at the seat of injury a fusiform swelling has formed upon each nerve. 2247

In the MS. Catalogue it is stated that the nerves were lacerated.

1124. Part of a radial nerve, the inner division of which has probably at some time been injured. At the seat of injury the nerve presents a swelling 2·5 cm. in length, and composed of two fusiform enlargements connected by a narrower part. Two of the digital branches also present distinct thickenings. 5756

From the dissecting-room. It is probable that the nerve had been incompletely divided.

Bulbous Nerves from Stumps.

1125. The ends of the tibia and fibula from an amputation-stump, with the endings of the anterior and posterior tibial nerves, the rest of the soft parts having been dissected away. The end of each nerve is enlarged into a fusiform swelling by the growth of a dense mass of fibrous-looking tissue. As appears from the section of the posterior tibial, the fasciculi of the nerve are partly stretched over and partly pass through the new growth. The bulbous ends are firmly attached to the periosteum by dense cicatricial fibrous tissue. The nerves do not reach the ends of the bones by about 3 cm., showing that they have slightly retracted after division. The divided ends of the bones are closed by osseous tissue and are smoothly rounded. 3699

No history.

1126. The ends of the radius and ulna from an amputation-stump, with parts of the ulnar and median nerves. Each of the nerves presents an oval enlargement at or near its divided end. These bulbous enlargements are connected with the extremities of the bones by dense cicatricial fibrous tissue, which has been dissected out as two thick bands. The ends of the bones are closed in and smoothly rounded. 3739

No history.

1127. Part of the sciatic nerve from an old amputation-stump. The nerve ends in a flattened oval mass composed of dense fibrous tissue, the fibres of which are, in many parts, arranged concentrically around different points, as is common in fibromata. Some of the fibres of the nerve appear to be stretched on the surface of the new growth, whilst others pass through it. In the part of the nerve exposed by the section are yellow streaks, indicating the presence of nerve-fibres which have undergone fatty atrophy. 4322

The specimen was removed from the stump of a man, aged 70, whose thigh had been amputated 40 years before for disease of the knee-joint. The bulbous nerve lay only one-third of an inch beneath the surface of the cicatrix, with which it was closely connected. The patient suffered no pain in the stump beyond the usual slight uneasiness during sudden changes in the weather.

Microscopic examination of the nerve one inch above the bulb showed "a great part of the nerve-tubules to have been replaced by a new connective tissue, containing very many nuclei and but few elastic elements. The whole bulb is composed of this tissue, except that, here and there, a fatty streak is observable, apparently the remains of a nerve-tubule."

1128. Portion of the stump of a forearm. On one side a part of the ulnar nerve has been dissected out from the surrounding parts; its end is enlarged and bulbous, and connected to the cicatrix by a short band of fibrous tissue. 2093

No history.

TUMOURS OF NERVES.

The term "neuroma" is clinically applied to all tumours formed in connection with nerves. Pathologically, it is more correctly applied only to those which are composed of nerve-tissue of new formation, or true neuromata. If the "amputation-neuromata" are excluded, such growths are of extreme rarity. Tumours in nerves, or false neuromata, spring from the connective tissue of the nerve-trunk, and the nerve-fibrils, scarcely altered in appearance, are stretched over the surface of the growth (1130). The tumour can in many cases be removed with ease from amongst the fasciculi of the nerve, leaving the trunk uninjured. The most common form of tumour in nerves is the fibroma (1129); but sarcomata of various kinds and myxoma are also met with. Secondary changes, such as calcification or ossification of the fibromata, and mucous softening of the myxomata, may occur. Tumours in nerves may be single, but are more frequently multiple.

1129. Portion of the branch of an anterior crural nerve which supplies the vastus internus muscle, and a flattened oval tumour which has grown between and separated its fasciculi. In its longest diameter the tumour measures 4 cm. Its central portion is soft, and its cut surface granular, as if from commencing degeneration. In four or five situations there are irregular spaces in its substance, which contain a yellowish friable material. 3625

Microscopic Structure.—The tumour is a fibroma.

From a subject brought into the dissecting-room.

1130. Portion of a large nerve, between the fibres of which a lowly lobulated oval tumour has grown, the fasciculi of the nerve being stretched and spread out over its surface. Pieces of bristle have been passed beneath the separated fasciculi. A section which has been made of the morbid growth shows it to be formed by very dense fibrous tissue. The tumour is 3 cm. in its longest diameter. 3737

Microscopic Structure.—The tumour is a cellular fibroma.

1131. Portion of a musculo-spiral nerve, the fibres of which have been separated at one part by the growth of a small tumour in the connective tissue between them. The tumour is oval, nearly 2 cm. in length, and is quite unconnected with the fasciculi of the nerve. It is composed of yellowish, homogeneous, friable substance, surrounded by a thin membranous capsule. 443

Microscopic Structure.—The growth is a richly cellular fibroma.

1132. An oval fibroma, which was removed from the median nerve. The tumour measures 3·5 cm. in its chief diameter.

Microscopic Structure.—The tumour consists of a finely fibrillated matrix containing an abundance of small spindle-shaped cells.

From a woman, admitted into U. C. H. under Mr. Heath's care in 1876. The tumour formed a swelling immediately above the wrist, and was exquisitely tender and spontaneously painful. The fingers were flexed, and a continuous burning pain was complained of in the index and middle fingers. The tumour was removed by dissecting it from the nerve between the fasciculi of which it was contained.

Sensation was deficient in the middle and index fingers after the operation; but in a few days it was restored, and the patient shortly left the hospital quite well. (Mr. Heath's *Case-books*, 1876, vol. ii. p. 247.)

1133. A flattened oval tumour, which was removed by operation, together with a portion of the ulnar nerve. The tumour is enclosed within a complete and easily separable fibrous capsule, with which, over the back of the specimen, is intimately connected the flattened portion of the trunk of the nerve. The cut surface of the growth has in parts a slightly fibrous appearance, whilst in other parts it is more friable and of a brownish colour. 6802

Microscopic Structure.—The tumour consists of loose fibrous tissue, containing in parts an abundance of small round cells. The blood-vessels are very numerous, some areas of the section being almost entirely vascular.

From a woman, aged 21, who was admitted into U. C. H. under the care of Mr. Heath, Jan. 4, 1892, on account of a swelling of two years' duration on the inner side of the right arm; for 6 months the tumour had been painful and increasing in size. The fibres of the nerve were spread out on the tumour, which was removed by dividing the nerve above and below it. The ends of the nerve could not be approximated. On the third day the wound was opened up and a piece of the posterior tibial nerve, 2½ inches long, from a limb just amputated was sutured with fine silk to the freshened ends of the nerve. The wound healed by first intention, but on March 27, 1893, it was reported that there had been no restoration of function in the ulnar nerve. (Mr. Heath's *Case-books*, 1892, vol. i. p. 48.)

1134. One half of a large oval tumour which was removed by operation, together with a considerable length of the median nerve. The tumour measures 13 cm. by 8 cm. in its two chief diameters. The surface is slightly lobulated and is covered with a well-marked fibrous capsule, which in parts is easily separable from the surface of the growth. The median nerve can be seen passing on to the tumour near one edge of the section and can be traced on the outer surface of the capsule, where the fasciculi are spread out over a considerable area and become collected together again as the nerve passes off the lower end of the tumour. The cut surface of the growth has a coarsely marbled appearance; it is divided up into irregular lobules, some of which present a dense fibrous structure, whilst in large areas the proper tumour substance is obscured by extensive extravasations of blood, presenting variations of colour from dark red to yellowish brown. 6547

Microscopic Structure.—The mass is composed of blood-clot, from which in many parts the blood-corpuscles have disappeared, leaving only a fibrinous coagulum. The clot is traversed by fibrous septa, which probably represent the remains of a tumour into which extensive hæmorrhages have occurred.

1135. A globular shell of bone, either the wall of a cyst or the peripheral portion of some tumour which has undergone ossification. 3360

It was removed by Mr. Quain from a woman, 32 years of age, who had suffered constant acute pain in the sole of the foot for six years previously, without any signs of local disease. In the ham was detected a small painful tumour, which was enucleated from the internal popliteal nerve. All pain at once ceased.

1136. A portion of the left vagus nerve from an old woman. Connected with its sheath is a small calcareous nodule of doubtful origin, which lay in contact with the arch of the aorta.

From the dissecting-room.

1137. Portion of a brachial plexus in the connective tissue between the cords of which two small tumours have grown. The larger of the tumours is of a regularly oval form and about 1 cm. in length; the other is considerably smaller. The tumours are situated almost close together, and are quite unconnected with the nerves between which they lie. 4053

1138. Portions of the nerves of a cervical plexus, some of which present slender fusiform swellings, due to the growth between their fibres of secondary nodules of sarcoma. 4052

From a man who was the subject of multiple tumours affecting the subcutaneous tissue in the mammary region (see Sarcomata of Skin), the heart (see Medical Catalogue), and the inferior vena cava and external jugular vein (see Nos. 1314, 1315).

The growths are small round-cell sarcomata. (Med. Times and Gaz. 1852, vol. ii., Aug. 21 & 28, and Dr. Walsh's *Case-books*, vol. vii. p. 172.)

INJURIES AND DISEASES OF ARTERIES.

Series I.—INJURIES OF ARTERIES AND THE SURGICAL TREATMENT OF ARTERIAL HÆMORRHAGE.

Contusion of an artery may tear through the inner and middle coats, which retract upwards and downwards within the vessel so as more or less completely to obstruct the lumen above and below the injury.

The injury may be followed by thrombosis.

If the contused vessel is exposed in a septic wound the damaged wall may slough and secondary hæmorrhage follow.

Subcutaneous rupture of an artery may result either in an immediate hæmorrhage into the surrounding tissues or in the formation of a traumatic aneurism (see Traumatic Aneurism).

Laceration of an artery results in the tearing across of the inner and middle coats, whilst the outer coat is drawn out and twisted into a tapering point beyond the others before it tears through (1141). A large vessel may thus be torn completely across without any hæmorrhage taking place.

Complete division of an artery. In this injury, unless the wounded vessel be very large, the immediate arrest of hæmorrhage is brought about by the contraction of the muscular coat, the retraction of the vessel within its sheath, and the coagulation of the blood in and around its extremity.

Punctured wounds of arteries cause serious hæmorrhage, the natural arrest of which is hindered by the inability of the vessel to retract completely (1139). A punctured wound involving an artery and vein may be followed by so-called "aneurismal varix" or by the formation of an arterio-venous aneurism (see Traumatic Aneurism).

The methods most commonly adopted for the arrest of arterial hæmorrhage are the application of a ligature and torsion; the actual cautery is occasionally used.

Ligature.—In the application of a ligature to a large artery, the lumen may be merely occluded, or the ligature may be so applied as to cut through the inner and middle coats, the divided edges of which retract into the lumen of the vessel (1141).

It is probable that in all cases coagulation takes place within the vessel, and may extend upwards as far as the next collateral branch (1144). When an artery is ligatured in its continuity the coagulum within the vessel is more extensive above than below the ligature.

Torsion.—When the end of a divided artery is twisted with suitable forceps, the inner and middle coats give way transversely immediately above the part of the artery grasped in the forceps. The external coat alone remaining is twisted into a spiral knot for a distance varying with the size of the vessel and the number of turns given, while the inner and middle coats are separated from it and pushed upwards into the canal of the artery for a corresponding distance, turning inwards as this takes place. On laying the vessel open it is seen that the inverted inner and middle coats give rise to an appearance almost resembling a valve, with the concavity of its free edge directed towards the heart (1141).

Actual cautery.—The actual cautery forms an adherent charred mass which closes the vessel effectually. In preparing specimens on the dead subject it will sometimes be found that the external coat only is involved in the eschar, while the inner and middle are turned up into the vessel as in torsion. Possibly this condition is more likely to occur in a living artery (1141).

The processes concerned in the healing of wounded arteries after the immediate arrest of the hæmorrhage, whether by natural or artificial means, are essentially the same as those occurring in the healing of other parts. The coagula within and around the vessel take no active part in the formation of the scar-tissue by which the artery is finally obliterated. The new tissue is derived from the plasma cells of the arterial wall and the endothelial cells which line it. If a ligature be used, this, according to the nature of the material composing it, undergoes absorption or becomes imbedded in scar-tissue. The final result of the healing process is that the artery, often as far as the origin of the nearest collateral branch, becomes a solid fibrous cord. When an artery is tied in its continuity, obliterative changes occur on each side of the ligature.

The causes of *Secondary Hæmorrhage* are chiefly illustrated among the specimens of ligature for aneurism, in all of which very coarse imperfectly prepared ligatures had been applied and the maintenance of asepsis in the wound not provided for. In these circumstances the ligature necessarily separated after ulcerating through the wall of the artery, and unless the internal coagulum were well formed, severe hæmorrhage almost necessarily occurred during the separation (1260).

The above causes of secondary hæmorrhage have been almost entirely obviated by the use of properly prepared ligatures and the maintenance of asepsis, whilst the importance of the internal coagulum as a preventive of hæmorrhage after ligature has become small.

1139. A short piece of a deep epigastric artery, in the wall of which is a small perforation. 5574

The injury occurred during the operation of paracentesis abdominis. The artery was cut down upon and the wounded part removed between two ligatures.

1140. Portion of a right common iliac artery, with parts of its external and internal divisions. In the common iliac artery, close above its bifurcation, is a small oval aperture, which resulted from perforation of the vessel by the point of a pin, which pierced it from the cæcum. A glass rod has been placed in an irregularly ulcerated track in which the pin lay. The aperture in the artery is about 4 mm. long, and its edges are smoothly rounded, like the natural aperture of an arterial branch.

The patient, a woman, was subject to discharge of blood from the anus, without any evident cause, and for which she took medicines without relief. She gradually became emaciated from repeated hæmorrhage, and died exhausted. The pin was found, after death, lodged in the cæcum, its head covered with a greenish deposit, and the point projecting through the aperture in the wall of the right common iliac artery. The pin was about an inch and a half long. The aperture in the cavity was partly plugged with fibrin.

1141. Four portions of the larger arteries from a dead body, prepared to illustrate the immediate effects of injuries and surgical treatment. In the highest specimen the vessel has been completely torn across; the inner and middle coats are cleanly ruptured transversely, whilst the outer coat has been drawn out, but not ruptured. In the second specimen, in which torsion was applied to the divided vessel, the external coat alone is twisted, whilst the inner and middle coats are turned up into the lumen of the vessel for a distance of 1 cm. In the third specimen the inner and middle coats have been divided transversely by the application of a fine ligature, the outer coat remaining intact. In the lowest specimen the divided end of the vessel has partly been occluded by the application of the actual cautery.

1142. Portion of an external iliac artery on which a thick silk ligature has been placed. The artery at the seat of ligature is apparently unaltered. 3665

The ligature has accidentally been tied so loosely as not to completely obstruct the artery, and the inner and middle coats are not divided.

1143. Portion of a large artery, probably the femoral, taken from a stump five days after amputation. The noose of the ligature is concealed beneath a layer of exudation. The small portion of the vessel on the distal side of the ligature is closely contracted. There is no clot in the vessel above the ligature; it may have been removed in making the preparation. A second ligature has been placed on a branch given off from the main trunk, about 4 cm. from its end. 3715 A

1144. Portion of a femoral artery from a stump ten days after amputation. The noose of the ligature is concealed beneath a layer of exudation. The areolar tissue on the exterior of the artery is loose and unaltered. The vessel above the ligature is fully occupied for about 4 cm. by a cylindrical clot, the upper part of which is continued into the mouth of a large branch arising from the trunk at a point corresponding with the upper limit of the coagulum. The portion of the clot shown at this part is not adherent to the interior of the vessel. 3598

1145. Portion of a femoral artery from a stump fourteen days after amputation. The upper part of the vessel is occupied by a pale yellow coagulum, which ceases about 8 cm. above the seat of ligature immediately below the origin of a branch. The whole of the vessel below was probably occupied by a continuation of the clot; near the lower end of the portion remaining is the aperture of a small branch. The lower end of the artery is adherent to the surrounding parts by a mass of granulation-tissue, in which the noose of the ligature remains imbedded. 3579

1146. Portion of a ligatured artery from an amputation-stump, the ligature having come away. The end of the vessel appears to have been firmly closed and united to the surrounding tissues. In its lower part there lies a clot about 4 cm. in length, the upper part of which quite fills and is adherent to the vessel, whilst the lower diminishes in size to a mere thread, without a corresponding contraction of the artery. Part of the coagulum has probably been lost in preparing the specimen. 3597

1147. The main artery and vein of a thigh-stump, five weeks after amputation. The lower end of the artery, for a distance of about 3 cm., is filled by a firm somewhat conical coagulum, which has become adherent, though at its upper end not firmly, to the interior of the vessel. The coagulum is limited above by three small arterial branches, and is somewhat irregular in form, being prolonged into the highest of the branches by a fine fibrinous filament. The artery has been laid open over the upper part of the clot, and is artificially separated for a short distance from the latter. The upper part of the clot is covered with a delicate organized membrane, which has been stained. The wall of the vein is thickened, and the lower part of its lumen appears to be occupied by a coagulum. 3715 C

1148. Portion of the brachial artery and one of its accompanying veins from an amputation-stump. A double ligature has been placed on the artery close below a small branch. The surrounding tissues are consolidated and combined by granulation-tissue to the ends of the vessels, the noose of the ligature being buried amid the consolidated tissues. There is a minute coagulum in the end of the artery. The vein is firmly closed. 633

1149. Portions of the femoral artery and vein from a stump, probably between two and three weeks after amputation. The ligature has come away from the artery, the end of which is conical and has apparently healed. There is a very small clot, as in the preceding specimen, in the end of the artery. A narrow buff-coloured clot is adherent to the interior of the vein; the centre of the clot is hollow, probably from softening; about 2 cm. beyond its upper end is a pair of valves, and immediately beyond these a large tributary enters the main vessel. 2708

1150. Portion of the artery from a stump, probably about a week after amputation. On one of its main branches a double ligature has been placed. The exudation surrounding the ligature has been dissected away. Two smaller vessels are firmly closed, apparently after ligature. The main vessel shows extensive changes resulting from chronic endarteritis with calcification. 1431

1151. Portion of a femoral artery, including part of the profunda branch and portions of the corresponding veins. Upon the artery, about 1 cm. below the origin of the profunda, a ligature was placed previously to amputation through the hip-joint. Owing to a high division of the vessel the ligature was applied to the superficial instead of to the common femoral, as was intended. The loop of the ligature is hidden by exudation. A coagulum fills the short part of the vessel between the seat of ligature and the origin of its deep branch; the portion below the ligature is also filled with loose-textured clot, a ligature having been also applied to the divided end of the vessel. The femoral vein is empty at its upper part, but its distal end is filled with coagulated blood. 3683

1152. Portion of an axillary artery and vein, with the cords of the brachial plexus. The artery has been ligatured in its continuity, in the third part, beyond the pectoralis minor, and where surrounded by the cords of the brachial plexus.

A triple ligature has been applied, probably from fear of cutting through the artery with a single thread; the knot has jammed, and the vessel is merely loosely constricted. The portion of the vessel below is occupied by a loose clot fixed by its upper end. Close above the ligature is a small ulcerated aperture in the artery (marked by a bristle), from which repeated hæmorrhage subsequently occurred. The noose of the ligature is partly concealed by exudation. 634

From a patient whose arm was amputated near the shoulder for sloughing of the skin of the forearm from phlegmonous erysipelas. Sloughing of the flaps ensued, with secondary hæmorrhage. Mr. Shaw ligatured the axillary artery as high as possible from the axilla. Some days afterwards the hæmorrhage recurred, and the patient succumbed under repeated loss of blood.

1153. Portion of a common iliac artery, with its divisions and part of the femoral. On the first a double ligature was placed for secondary hæmorrhage, which occurred twelve days after amputation of the thigh. A small conical clot lies within the end of the femoral artery, which appears firmly closed. 3602

From a boy, 8 years of age, in whom the thigh was amputated through the small trochanter, on account of necrosis of the entire shaft of the femur. On the twelfth day repeated hæmorrhage took place from the stump. The common iliac artery was tied, by Mr. Liston, about half an inch above its bifurcation. Collapse followed the operation. Transfusion was had recourse to with temporary benefit; the patient died about twenty-four hours after the application of the ligature. ('Med. Gaz.,' April 24, 1830, p. 124.)

1154. Portion of a femoral artery and vein, with part of the internal saphenous nerve, from an amputation-stump, about eight days after operation. The ends of the vessels have become inseparably adherent to the tissue around, and the artery contains a long tapering clot which is united below to the inner coat of the vessel. The artery has been tied with a double silk ligature, none of the ends of which have been cut off. 632

1155. Portion of a femoral artery to which a carbolized catgut ligature was applied six days before death, the artery being ligatured in Hunter's canal for secondary hæmorrhage. The lumen is completely obliterated by the ligature and contains a well-formed internal coagulum, which is more extensive above than below the seat of ligature. The ligature is apparently unaltered.

T. N., aged 40, an unhealthy man, worn out with bad living and drink, was admitted into U. C. H. June 11, 1872. On the left leg was an epitheliomatous ulcer, reaching from a short distance below the knee to the ankle. It had arisen in the scar of a scald received when he was a boy. Amputation was performed through the knee-joint on June 12. The vessels in the posterior flap were cut below the division of the popliteal. The posterior tibial showed marked calcareous degeneration, and the ligatures cut through it. It was finally secured by acupressure. The needle was removed on June 15; severe hæmorrhage, arrested by pressure, occurred on June 16. On June 18 severe hæmorrhage occurred in the night, and Mr. Heath tied the femoral artery in Hunter's canal. The wound suppurated and the patient died on June 24 of pyæmia.

Post mortem.—There were the ordinary appearances of pyæmia in the lungs, joints, &c. The wound made in ligaturing the artery was foul and sloughy. The ligature still held the artery firmly, but was somewhat softened; it had been applied with sufficient force to divide the inner and middle coats. There was a firm clot above and below the ligature, that below being the smaller.

1156. The bifurcation of an aorta, with the iliac arteries and part of the femoral of the left side injected with wax. The left external iliac was ligatured near its termination three weeks before death, on account of hæmorrhage which followed the opening of a swelling in the groin. The ligature has come away, and the parts of the vessel above and below are separated by 1 cm. The external iliac artery above the seat of ligature is filled with a long, cylindrical, firm coagulum, which adheres in places to the interior of the vessel. The divided end of the lower part of the vessel is still widely open, probably as a result of preparing the specimen. The coagulum below the seat of ligature extends into the femoral as far as the origin of its profunda branch, and is closely adherent to the interior. The wax with which the vessels have been injected has completely filled the femoral artery and its branches by means of the collateral circulation. The injection has passed in part also to the external iliac artery where occupied by the clot, apparently along some of its branches, which are filled. The external iliac vein is adherent to the artery at the point of ligature. A little way below the middle of the profunda is a mass suggestive of a thick-walled cyst, the anterior wall of which has been turned back; on the surface of this, at the back of the specimen, is a small piece of skin with a puncture in its middle.

From an old woman, in whom a swelling in the groin was opened by a lancet, the operation being followed by alarming hæmorrhage. Compression of the artery at the groin being made, the hæmorrhage ceased. When the surgeon arrived he found that florid blood flowed copiously from the puncture whenever the finger of the assistant was raised from the artery; he tied the external iliac, and there was no more bleeding. The ligature came away, but the external wound did not heal, and sinuses formed around it. About three weeks afterwards the patient died of peritonitis.

It would appear from the specimen that hæmorrhage was owing to one of the branches of the femoral artery having been opened either by the lancet or in consequence of destruction by the peculiar nature of the tumour.

1157. The abdominal aorta and common iliac arteries of a dog. On the aorta near its bifurcation a ligature was placed, the separation of which was attended with hæmorrhage. The blood, effused beneath the subperitoneal fat, forms an irregular globular sac 4 cm. in diameter, with a very uneven flocculent interior. The ligature, which is not completely separated, is lying within the sac. 3755

The ligature was applied experimentally by Mr. Syme.

1158. The abdominal aorta of a young subject, which has been wounded by a conical bullet, dried. The wound involves the anterior and posterior walls of the vessel immediately above the origin of the cœliac axis. The bullet, which lies in the aorta immediately above the bifurcation with its base downwards, has been exposed by cutting a round hole in the wall of the vessel. 6875

SERIES II.—DISEASES OF ARTERIES.

PRIMARY DEGENERATION.

Fatty Degeneration of the Inner Coat.—Opaque yellowish-white patches are very commonly found upon the inner surface of the larger arteries, especially the aorta, at almost any period of life, even in childhood; they vary in size from a pin's head to half-a-crown, and are usually of irregular outline. They are not sufficiently raised to be perceptible to the finger, and can be completely peeled off with the inner coat. Microscopic examination shows that these patches are due to fatty degeneration of the stellate corpuscles which lie in the homogeneous connective tissue which forms the subendothelial layer of the inner coat. The condition is of little importance.

In later life fatty degeneration of the connective-tissue corpuscles of the outer coat is not uncommon in the arteries of the brain; this condition is accompanied by softening of the coats of the artery, and tendency to rupture.

Calcareous Degeneration of the Middle Coat.—This is always a disease of advanced life. It affects chiefly the smaller arteries, especially the tibials, and is very commonly associated with chronic endarteritis in the larger vessels. It consists essentially of a deposit of lime-salts in the muscular fibre-cells of the middle coat. This causes the artery to become rigid, and often tortuous from loss of elasticity. Its calibre is diminished sometimes to a very great extent. The obstruction to the flow of blood thus produced may lead to gangrene (senile gangrene). If such an artery be soaked in turpentine and afterwards dried so as to render it transparent, opaque white lines will be seen in its coats arranged circularly, and corresponding in situation to the muscular fibre-cells. In consequence of this the condition is sometimes described as "annular calcification" (1159).

In the more advanced stages the rings of calcareous matter may coalesce, so as to convert the vessel into a rigid tube; the condition is then called "tubular calcification" (1159).

Primary fatty degeneration of the inner coat and primary calcareous degeneration of the middle coat must be clearly distinguished from the fatty and calcareous deposits so frequently present in chronic endarteritis. The former are affections of the original tissues of the arterial coats; the latter result from degenerative changes in the products of a chronic inflammation.

Lardaceous Degeneration.—This is particularly common in the walls of the arterioles and capillaries. In the liver, spleen, and other viscera liable to this degeneration the change is first noticeable in the middle coat of the small arteries.

Fibroid Degeneration.—A form of arterio-sclerosis affecting chiefly the intima is met with chiefly in association with chronic renal disease.

1159. The femoral and popliteal arteries, dried. Throughout their length they have been converted into rigid tubes by calcareous deposit. The earthy matter, where in least abundance, is arranged in parallel lines across the vessel in the circular fibres of the middle coat; but for the most part these lines have coalesced and form considerable plates, the margins of which are deeply toothed.

The profunda and other branches present similar changes. All the vessels are more tortuous than natural. 3716

1160. Three pieces of an artery, from the lower limb probably of an aged subject, dried. All of them exhibit extensive calcareous degeneration of the muscular fibres of the middle coat. 3837

1161. The femoral, popliteal, and greater part of the tibial arteries, from an old man, who died of spontaneous gangrene of the foot. In the upper 9 cm. of its length the femoral artery shows well-marked calcareous degeneration of the muscular fibres of the middle coat. The calcareous deposit appears in the form of small yellowish spots and streaks arranged in lines disposed transversely to the length of the artery, in accordance with the direction of the circular muscular fibres (primary or annular calcification). At a lower level the vessel is also the seat of advanced endarteritis, the inflammatory products in the inner coat having undergone extensive calcification with the formation of long irregular calcareous plates (secondary or laminar calcification). The popliteal artery is in its whole length plugged with a firm clot; the latter is closely adherent to the inner coat of the artery at the upper part, but loosely below. Similar degenerative changes have occurred in the tibial arteries, by which they have been diminished in calibre and made rigid and inelastic. 3714

The specimen well illustrates the co-existence in the same artery of primary calcification of the middle coat and chronic endarteritis with subsequent calcification in the inner coat. It is probable that the plugging of the artery which caused the gangrene has arisen from thrombosis commencing at the point where the clot is most adherent and the artery most diseased.

1162. Portion of a femoral artery from an old man. The whole length of the portion shown is plugged with a clot, firmly adherent by its middle, but less so by its ends, the upper of which is conical and rounded. Over a great part of its extent the inner coat is separated from the middle, and is opaque and slightly thickened. The muscular coat is extensively calcified. The vessel itself is tortuous. Death ensued from some cause quite unconnected with the state of the artery. 3560

1163. The popliteal, with portions of the anterior and posterior tibial arteries, and parts of the tibial and internal saphenous veins; from a case of spontaneous gangrene of the foot. The tibial arteries and the lower part of the popliteal exhibit considerable calcareous degeneration, the middle coat, rather than an inflammatory growth in the intima, being chiefly affected. The calibre of the popliteal artery at its bifurcation is considerably diminished ; its lower part is occupied by a clot, which is prolonged for a short distance into its divisions, and is adherent only to the middle of the vessel. The posterior tibial vein contains a short clot firmly adherent at its middle, but conical and free at each end. The femoral vein at the entrance of the saphena, and for 6 cm. below, is firmly plugged by an adherent coagulum, which extends a considerable distance down the saphena. The thrombus is tough and laminated. The coats of the vein opposite the thrombus are slightly swollen. 5222

The patient was an old woman, admitted to the hospital, under Sir J. Erichsen, in April 1866, for gangrene of the foot. The gangrene was of a mixed character, neither markedly dry nor moist. The post-mortem examination showed considerable degeneration of the larger arteries and of the aortic valves ; on the latter were some small "fibrinous vegetations." It would seem from the history that the gangrene was possibly due to the simultaneous occurrence of thrombosis in the femoral vein and at the diseased part of the popliteal artery.

1164. The lower part of an abdominal aorta together with the main arteries of the lower limbs, dried. In the aorta and common iliac arteries are irregular calcareous plates resulting from calcification occurring as a result of chronic endarteritis. From the bifurcation of the iliac artery to the origin of the deep femoral the vessel on each side is free from calcification. Below the origin of the deep femoral the arteries show extensive calcification, which in many places is definitely arranged in transverse lines corresponding in direction with the muscular fibres of the middle coat. The calcification is less marked in the popliteal artery than in the lower part of the femoral, but is most extreme in the vessels of the leg. 8595

The specimen illustrates the association in the same subject of primary calcification of the middle coat (femoral and tibial) with calcification secondary to chronic endarteritis (aorta and common iliac).

From a man, aged 56, who was the subject of carcinoma of the colon. Whilst in the hospital gangrene of both feet occurred. The veins are preserved in No. 1313. (Mr. Godlee's *Case-books*, 1900, vol. i. p. 321.)

ACUTE INFLAMMATION OF ARTERIES. ACUTE ARTERITIS.

Acute inflammation of arteries is rare. It may result from the presence of an inflammatory focus in the neighbourhood of the vessel, and may lead to thrombosis, ulceration of the arterial wall followed by hæmorrhage (1166), or weakening of the vessel with the production of an aneurism. A localised acute arteritis may also result from the lodgment in the vessel of an infective embolus.

1165. The bifurcation of an aorta, with the left common iliac, part of the internal and the whole of the external iliac, and part of the femoral, arteries. The external iliac artery has been ligatured in its continuity, and divided by the separation of the ligature about 2 cm. below its origin. The portion between these two points is firmly plugged with coagulum which projects beyond its extremity. The end of the distal portion of the vessel is widely open and separated by a considerable interval from the closed end of the proximal part, probably from careless dissection of the specimen. The tissues around are indurated and firmly adherent to the artery.

About 3 cm. below the open mouth of the distal portion the artery and vein are almost completely destroyed by ulceration. Below this level the two vessels have been cut across. The vein contains a large clot firmly adherent by its upper end. The occlusion of the vein was probably the cause of the gangrene from which the patient died. 630

from [illegible] with extensive cutaneous eruption. & rupia & [illegible]
but later, aneurysm, & arteriosclerosis are rare

The patient, a young seaman, was admitted on board the hospital-ship 'Grampus,' with a bubo in the left groin. After three weeks his health became bad, and the bubo extended rapidly in all directions, especially amongst the abdominal muscles and towards the femoral artery. About four months later a pulsating tumour, as large as a pigeon's egg, formed in the course of one day an inch below Poupart's ligament. On the following day it burst and the patient lost much blood. The external iliac was at once tied with some difficulty. The ligature came away on the tenth day, but gangrene set in, and death ensued twenty days after the operation.

1166. Portion of the skin and subjacent soft parts, from the front of the wrist, swollen and infiltrated from phlegmonous erysipelas, which followed an injury of the thumb. Over the situation of the radial artery the tissues have been destroyed by sloughing and ulceration. The radial artery is ruptured, its ends being separated by an irregular cavity lined with a thin layer of laminated clot. Each end of the artery is closed with a loose coagulum, which appears to have been continuous with that in the cavity noticed. The coagulum within the lower end of the artery is but half enclosed, the wall of the vessel having been irregularly destroyed by ulceration. 2819

From a severe case of phlegmonous erysipelas. The artery was involved in the suppurative inflammation, and its walls became softened and gave way during life. The patient died a few days afterwards.

1167. A larynx, trachea, pharynx, and œsophagus, together with part of the aorta and the large vessels of the neck. An irregular abscess-cavity has opened into the œsophagus and the common carotid artery on the right side. On the right side the abscess-cavity lies behind the carotid artery and extends from the level of the lower border of the cricoid cartilage downwards to within about 2 cm. of the bifurcation of the trachea. The abscess extends across the middle line behind the œsophagus, and on the left side has relations very similar to those on the right, although the cavity itself is narrower. The soft parts surrounding the abscess-cavity are in all parts considerably thickened. The thickening is very marked around the middle part of the right common carotid artery, and at a point 3 cm. above its origin the artery presents an irregular ulcerated opening into the abscess-cavity. The opening of the abscess-cavity into the œsophagus is situated in the right wall of the tube 3 cm. below its commencement; it measures more than 1 cm. in its greatest diameter. 5535

CHRONIC INFLAMMATION OF ARTERIES. CHRONIC ENDARTERITIS.

Endarteritis deformans.—The first sign of this very common disease is the formation of flat, smooth elevations, of variable size, in the inner coat of the artery; sometimes the surface is slightly tuberous; the outline of the patches is irregular, they are bluish or reddish-grey in colour and of cartilaginous hardness (1168). They are most commonly found in the aorta and larger arteries. The patches are usually of an elongated form, their greatest length corresponding with the course of the artery. Around the orifices of the branches the thickening of the vessel frequently takes the form of ring-like elevations (1176) and may cause their complete obliteration. Microscopic examination shows that these patches are due to a thickening of the inner coat, the connective tissue of the subendothelial layer being increased in quantity and the new growth closely resembling the normal structure. In the later stages of the disease fatty or calcareous degeneration occurs in the new tissue thus formed in the inner coat. The first sign of fatty degeneration is the appearance of yellow streaks and spots in the elevated patches. These streaks and spots gradually fuse together until the whole mass assumes a uniform colour. The degeneration commences in the cells; but later on the new connective tissue between them also breaks down. Softening then commences in various spots which run together, till the whole may be reduced to a greasy mass consisting of fat-granules mixed with crystals of cholesterin still covered superficially.

by the innermost layers of the inner coat; these are supposed to derive their nutrition from the passing blood, and so to escape degeneration. This is the condition which has given the name "atheroma" to the disease, from the porridge-like appearance of the degenerated tissue. Still further softening may occur, and the yellow patch may liquefy, giving rise to the so-called "atheromatous abscess," although the name is a bad one, as no pus is present. Finally, the thin remaining layer of the inner coat may give way, and the fatty substance be discharged into the circulation, leaving a ragged unhealthy excavation with undermined edges, the so-called "atheromatous ulcer" (1169).

In calcareous degeneration lime-salts are deposited as minute granules in the new connective tissue of the elevated patches in the inner coat. This change is preceded by a fatty degeneration of the cells. Finally a dense hard plate of calcareous matter takes the place of the original patch. If this be treated with diluted acids, the remains of the fibrous tissue can be again brought into view, but no cells are to be seen. This condition is described as "laminar calcification" of the artery (1171, 1179). The calcareous plates are covered by a thin layer of the inner coat; but in the later stages this wears away in parts, and the calcareous matter is in actual contact with the blood (1176). Coagulation may take place upon any surfaces from which the endothelium has been removed, and the clots may be washed onwards and cause obliteration of distant arteries.

Chronic endarteritis is usually accompanied by degenerative changes in the other coats of the artery, leading to loss of elasticity, which may be followed by dilatation of the affected vessel and the formation of aneurism. (See "Aneurisms.")

Amongst the chief causes of atheroma are increased arterial tension from any cause, abuse of alcohol, gout, and syphilis.

Endarteritis proliferans.—This name has been applied to a chronic inflammation of the large arteries sometimes met with as a cause of gangrene of the extremities. The blocking of the vessel appears to result from thickening of the inner coat, and the corresponding veins may be similarly affected. The causes of the disease are uncertain.

Syphilitic endarteritis is met with chiefly in the smaller arteries, such as those at the base of the brain and in association with chronic syphilitic inflammations. It is characterised by chronic inflammatory thickening of the intima, which may reach such a degree as almost to occlude the lumen of the vessel. The extent to which syphilis acts as a cause of the common form of chronic endarteritis met with in the large arteries is uncertain.

1168. Part of an aorta, extensively affected with chronic endarteritis. The inner surface, which is in parts deeply wrinkled, is marked with irregular lowly-raised prominences, but the surface itself is intact. In part of the specimen the superficial layers of the intima have been reflected in order to display the thick inflammatory deposits in its deeper layers. The outer and middle coats are unaffected.

1169. The lower part of an aorta, with portions of the common iliac arteries. In the wall of the aorta, a short distance above its bifurcation, is a semilunar excavation placed across the vessel and extending more than a third round its circumference, and due to the softening of a chronic inflammatory deposit, over which the remaining superficial part of the inner coat has given way. The edges of the "ulcer" are thinned, uneven, and slightly undermined. The interior of the rest of the vessel presents several opaque, white, lowly-raised, irregular swellings, due to chronic inflammation of its inner coat. 2042

1170. The termination of an aorta, together with parts of the common iliac arteries, the inner coat being extensively affected with chronic endarteritis. In a few places the inflammatory deposit has undergone calcification. Close above its bifurcation the aorta presents an irregular depression, the edges of which are abrupt and slightly undermined; this has resulted from softening of the inflammatory deposit and loss of the superficial layer of the intima. 612

1171. Portion of an aorta, in the deeper layers of the inner coat of which numerous calcareous plates have been formed in chronic inflammatory patches. Over many of the plates the endothelium has disappeared, so as to leave their surfaces exposed to the blood-stream. By the dissection of the lower part of the specimen it is shown that the outer and middle coats are healthy and that the chronic inflammatory process is confined to the deeper layers of the inner coat. 1220

✓ **1172.** Portion of a thoracic, with the upper part of the abdominal aorta, showing various changes due to chronic endarteritis. The inner coat is throughout more opaque and yellow than natural. The mouth of the cœliac axis is distorted and diminished in size by the new growth around it; the superior mesenteric artery is completely obliterated close to its origin, and the orifice of the left renal artery is somewhat lessened in size. At the lower part of the specimen some of the inflammatory deposits have undergone calcification. 1260

The inferior mesenteric artery was also occluded, and the intestines were supplied chiefly by the hæmorrhoidal and pancreatico-duodenal arteries.

B **1173.** Two portions of an aorta, one from the upper part of the abdominal, the other from its thoracic division, extensively affected with chronic endarteritis. The remains of the internal coat are in places cracked and fissured between the calcareous deposits, probably in the preparation of the specimen. The mouths of the larger vessels are misshapen and slightly narrowed. 611

From a patient who died from rupture of an aneurism of the arch of the aorta.

1174. The ascending part of a thoracic aorta affected to an extreme degree with chronic endarteritis, the inner coat being deeply wrinkled and tuberculated. The deeper parts of the deposits have in several spots undergone calcification. The thickness of the inflammatory deposit in the inner coat is well seen in the section of the artery. The aortic valves are thickened. 2266

✓ ✓ **1175.** An abdominal aorta, with portions of the common iliac arteries, the several vessels being extensively affected with chronic endarteritis. The inflammatory deposits have, for the most part, undergone calcification, the inner coat being to a great extent replaced by calcareous plates, so as to form an incomplete rigid tube within the wall of the vessel. In several places scales of earthy matter lie exposed by the loss of the endothelium. Along the cut edge the coats of the aorta have been separated from each other for a short distance; the external coat is not discernibly altered, nor unnaturally adherent to the middle; the inner and middle coats are at many points inseparably blended. The common iliac arteries are similarly affected. In the preparation of the specimen many of the calcareous plates have been cracked and project into the vessel. 2148

1176. An aorta, with parts of the iliac arteries, extensively affected with chronic endarteritis. The thickening of the inner coat is most advanced around the orifices of the small branches, so as to form smooth circular elevations, in some places as much as 1·5 cm. in diameter. In many places the inflammatory deposits have undergone calcification, the calcareous plates being extensively exposed by the loss of the endothelium. In parts of the iliac arteries calcareous degeneration of the middle coat has also occurred. 7670

From a man, aged 54, a ship's clerk, who died of pulmonary tuberculosis. The radial arteries were extensively affected with annular calcification. (Dr. Bastian's *Case-books*, Males, 1896, p. 552.)

1177. An abdominal aorta, with the right common iliac artery. In both vessels the internal coat is thickened and almost everywhere uneven and dull white from endarteritis. The inflammatory patches have mostly undergone calcification. Some of the calcified parts have been broken across in preparing the specimen. 610

1178. Portion of a popliteal artery, with the commencement of the anterior and posterior tibial arteries. The interior of the first has been rendered uneven by chronic inflammation, and calcification of the deposits in its inner coat. The middle and outer coats are unaffected. 613

From a patient who died from rupture of an aneurism of the aorta.

1179. The lower part of an aorta, with the commencement of the common iliac arteries, dried. Their interior is paved with calcareous plates of various sizes formed in the internal coat by the calcification of inflammatory deposits. 1767

1180. The upper and lower ends of an aorta, with portions of the common iliac arteries, dried, and exhibiting similar, though less extensive changes. The margins of the aortic valve-flaps have, in places, been made rigid by similar disease.

1181. The lower part of an aorta, with the common iliac arteries, dried and made transparent with turpentine. In a few situations the vessels have been rendered opaque by calcification of inflammatory products in their inner coat. 1216

1182. A popliteal, with parts of the femoral and both tibial arteries, extensively affected with chronic endarteritis. The inner coat is opaque and thickened, and on the divided edges of the artery it has been raised by dissection from the middle coat. At the upper part of the popliteal artery the inflammatory products in the inner coat have accumulated in such amount as nearly to occlude the vessel. At the middle of its length the popliteal artery is nearly blocked by a small adherent thrombus. The posterior tibial artery is quite closed for 4 cm., probably by a thrombus adherent to its diseased wall. 4120

From a woman, 73 years of age. Five weeks before admission to the hospital the right foot became excessively painful, red, and much swollen. The disease was treated as erysipelas. On admission, the ankle-joint was slightly enlarged; redness extended about halfway up the leg; and there were three or four black patches about the size of a threepenny piece, with a larger patch over the tendo Achillis.

After death there was found extensive disease of the aorta and femoral arteries; the viscera were pale and flabby.

1183. An aorta, together with the main arteries of the left lower extremity and those of the right lower extremity as far as the popliteal. In its whole length the aorta is extensively affected with chronic endarteritis, which has led to the formation of large irregular patches of thickening causing considerable elevations on the inner surface of the vessel. In many of these patches the innermost layers of the intima have given way, and, by the escape of the softened inflammatory products beneath, rough irregular depressions have been produced. In many of these ulcers the edges are distinctly undermined. Over many of the patches loose fibrinous deposits are adherent to the inner surface of the vessel. Extensive calcification has occurred in the aorta immediately above its bifurcation and also in the right common iliac artery.

Along the whole course of the right femoral artery and that part of the popliteal which is preserved the inner coat is greatly thickened, and in many places is easily separable from the middle coat. The lumen is still further blocked by thrombosis, which, in the popliteal, has led to the complete obliteration of the vessel.

On the left side the femoral and popliteal arteries exhibit similar changes, but the lumen of the popliteal is not completely obstructed.

In the tibial and peroneal arteries the lumen is nearly blocked by thickening of the wall of the vessel. 8316

Microscopic Structure.—The aorta shows a fibrocellular overgrowth of unequal extent in the subendothelial layers. In those parts where the overgrowth is thickest it is undergoing disintegration and calcification. Extensive calcareous degeneration is also present in the muscle-cells of the middle coat. There is no fibrous overgrowth in the middle coat, but the outer coat is irregularly thickened. In the iliac artery the inner coat is irregularly thickened by dense fibrous tissue, in parts hyaline. The tibial artery examined is nearly blocked by fibrous thickening of the intima; patches of calcareous degeneration are present in the middle coat.

From a man, aged 51, who was admitted into U. C. H. under the care of Mr. Heath in 1887. There was a history of rheumatic fever, gonorrhœa, and syphilis. On admission the right foot and the lower part of the leg were gangrenous. Amputation was performed at the junction of the upper and middle thirds of the leg; the patient was discharged 36 days after the operation. Eleven months later the patient was readmitted with dry gangrene of the 2nd, 4th, and 5th toes of the left foot; no pulsation could be felt in the arteries below the groin. Amputation was performed through the metatarsus. The flaps became gangrenous, and death occurred on the 8th day. (Surg. Reg. Rep. 1888, p. 29, No. 2691.)

1184. An aorta as low as the origin of the superior mesenteric artery. From its commencement to the level at which it passes behind the diaphragm the vessel is extensively diseased. The inner coat is uniformly thickened, and the inner surface is tuberculated and marked by longitudinal folds and furrows. The endothelium appears to be intact, and there is no evidence of calcification or softening. Immediately above the aortic valve, the flaps of which are thickened, the disease of the aorta is less marked than elsewhere. The orifice of the right coronary artery is dilated and that of the left much contracted. The orifices of the innominate and left common carotid arteries are normal, but that of the left subclavian is completely occluded by an adherent plug of dense fibrous tissue. The orifices of the intercostal arteries are almost obliterated. The disease of the vessel terminates, at the level above mentioned, very abruptly, the lower part of the aorta being to all appearance healthy. 6962

Microscopic Structure.—At the junction of the diseased and healthy portions of the artery it is seen that the thickening of the vessel results chiefly from chronic endarteritis, associated, however, with a fibroid overgrowth in the outer part of the middle coat and in the adventitia. Where the disease is most advanced the wall of the vessel is almost entirely replaced by fibrous tissue. A well-marked round-cell infiltration surrounds many of the vasa vasorum.

From a man, aged 40, who died suddenly in the London County Asylum, Colney Hatch, on November 3, 1890. A year previously the tongue had been removed for carcinoma at St. Mary's Hospital. There was extensive recurrence of the disease. The heart was greatly dilated; the kidneys were normal. (C. F. Beadles, Trans. Path. Soc. vol. xliv. 1893, p. 43.)

1185. The lower part of a popliteal artery, together with the tibial and peroneal arteries and some of the arteries of the foot, from a case of diabetic gangrene. The popliteal artery is rigid, and its inner and middle coats are uniformly thickened. Irregular calcareous deposits are present in the middle coat and can be recognised through the intima.

Similar changes are seen in the arteries of the leg and foot. The anterior tibial artery for a distance of 1 cm. from its origin is nearly occluded by the thickening of its wall, and in its lower half the vessel is again partially blocked by an adherent thrombus. The posterior tibial as far as the origin of the peroneal is completely occluded, but beyond this the vessel is dilated and contains adherent clot; in the rest of its extent the vessel forms an almost solid cord. The peroneal artery in its whole length is rendered impervious by adherent clot.

Microscopic Structure.—The inner coat is thickened. The thickening concerns chiefly the subendothelial layer, and results from an overgrowth of fibrillated and cellular tissue. The elastic lamina is partly destroyed. The middle coat is the seat of extensive deposits of calcareous matter.

From a man, aged 48, who was admitted into U. C. H. in September 1891, for gangrene of the middle toe of the right foot of a week's duration, following abrasion of the toe. On admission the foot was red almost as far as the malleoli. The urine measured about 90 ounces daily; sp. gr. 1040; 22·1 to 30·8 grains of sugar to the ounce. In spite of treatment the gangrene slowly spread. Amputation was performed above the condyles of the femur by the circular method. Except at one spot, the wound healed by first intention. In October 1892 patient was in fairly good health, but the urine still contained a large quantity of sugar and some albumen. (Surg. Reg. Rep. 1891, p. 52, No. 2354; and Godlee, Med. Chir. Trans. vol. lxxvi. 1893, p. 44.)

Thrombosis and Embolism.

Thrombosis occasionally occurs in the large arteries, but much less frequently than in the veins. It is most commonly the result of chronic arterial disease, and may thus be the determining cause of gangrene (1186). Arterial thrombosis may also result from injury of the vessel-wall or from inflammatory conditions in the surrounding tissues (1188). In some cases the cause is obscure and in others the thrombosis occurs in the course of infective diseases without any evidence of disease of the vessel-wall.

Embolism of the large arteries is an important cause of gangrene of the extremities (1189); the obstruction of the vessel being the result partly of the embolus and partly of the thrombus extending from it. Aneurism may also result from the arteritis caused by the lodgment of an infective embolus in the vessel (1255).

1186. The lower portion of a brachial artery, with the upper parts of its main divisions, from a case of spontaneous gangrene of the arm. The artery is filled with a cylindrical laminar clot, which extends for a short way into its radial and ulnar divisions, and is firmly adherent by its upper end to the inner coat of the artery. The walls of the artery, especially opposite the adherent part of the clot, appear to be swollen and are contracted. 3744

The thrombosis was probably secondary to inflammation of the arterial coats.

1187. The axillary and brachial arteries, the main branches of the former arising unnaturally close together. The upper part of the brachial artery is filled with a coagulum, from which stunted processes are continued into the larger branches. The peripheral portion of the clot is firm and laminated, and forms a tube enclosing the more central part, which is loose and flocculent or granular. Below the termination of the coagulum the inner surface of the artery presents a slightly tuberculated appearance. 1797

In the recent state the lower part of the vessel contained a slender clot which was probably of *post mortem* origin.

1188. A left external iliac artery, together with the termination of the common iliac and part of the internal iliac artery, with the external iliac vein and the adjacent part of the peritoneum and abdominal wall. The termination of the common iliac artery and the part of the internal iliac preserved are normal. From a point 1 cm. below its origin the external iliac artery is completely occluded for a distance of nearly 8 cm. and converted into a small pigmented fibrous cord; the surrounding tissues are thickened. The vein is similarly occluded in the lower 3 cm. of the portion shown; its highest point of occlusion is opposite the lowest point of the obliterated artery. The peritoneum is thickened, and coated with a thin membranous layer of exudation. 4098

The obliteration of the vessels probably resulted from thrombosis consequent upon some inflammatory condition in the surrounding tissues.

1189. The lower end of an aorta, together with the iliac and common femoral arteries, and part of the left femoral vein. The lower 2 cm. of the aorta contain a large partly decolorised clot which extends along the whole length of the common iliac, external iliac, and common femoral of the right side, and into the beginning of the superficial and deep femoral arteries. The thrombus also extends into the commencement of the internal iliac artery. On the left side the left external iliac is blocked at its origin, and from the upper end of the clot a slender prolongation is continued upwards through the common iliac artery into the aorta, where it joins the large thrombus above mentioned. Below, the thrombus extends as far as the origin of the deep femoral artery. The left internal iliac artery is thrombosed at a distance of 2 cm. from its origin, the clot extending into the gluteal artery. The portion of the left femoral vein preserved in the specimen contains an adherent decolorised clot. At all parts the arterial walls appear normal. 7714

From a woman, aged 47, who had had two attacks of acute rheumatism. A week before admission into U. C. H., under the care of Mr. Heath, she was seized with severe pain and loss of power in the left leg and foot. On admission the patient was slightly cyanosed; there was no cardiac murmur; the left foot and leg were purple and mottled as high as the upper third; no pulsation could be felt in the left femoral artery, but the pulsation in the right femoral was normal. A week later the left leg was gangrenous as high as the middle; two days later no pulse could be felt in the right femoral, but the limb was warm. On the 21st day a presystolic murmur was audible at the apex; later in the day sudden dyspnœa occurred with pain in the right side of the chest; this was followed by rales over the right lung, weak breathing and friction at the base, and expectoration of plum-coloured sputum. During the next week the patient improved, and amputation of the leg was performed in the upper third. Gangrene of the flaps occurred, and patient died 15 days after the operation. The right leg had become cold and mottled.

The left auricle was large and hypertrophied, and contained partly decolorised and adherent clot. The mitral valve was thickened, but presented no vegetations. There was a large infarct in the lower lobe of the right lung. The left renal artery was blocked at its origin in the aorta. (Surg. Reg. Rep. 1896, p. 122, No. 2191.)

1190. The lower parts of an aorta and vena cava, together with the large arteries and veins of the lower extremities, extensively diseased and thrombosed. The lower 9 cm. of the aorta are occupied by a firm, partly decolorised, slightly adherent thrombus. On the right side the clot is continued into the iliac arteries, and is prolonged into the femoral as low as a point 3·5 cm. above the origin of the profunda. On the left side the clot is continued into all the arteries of the lower limb as far as the smallest branches. The arterial walls are extensively diseased, and present the characteristic changes resulting from chronic endarteritis with calcification.

The vena cava is normal and free from clot. All the veins of the left lower extremity are filled and distended with adherent dark-coloured clot, in parts laminated and extending upwards to within 3 cm. of the bifurcation of the vena cava. On the right side the condition of the veins is the same, except that the thrombus ends above in a blunted extremity at the level of the termination of the deep femoral vein. 6819

From a woman, aged 66, who was admitted into U. C. H. under the care of Mr. Marcus Beck, Jan. 25, 1892. There was nothing of importance in the previous history. For nearly a year there had been swelling of the lower extremities, especially the left; for 3 months the left lower limb had been more swollen and cold. On admission the pulse was weak and compressible, and the heart sounds soft and muffled; there were rales on both sides of the chest. The left lower extremity was cold to above the level of the knee; the epidermis was macerated and separating, leaving a raw surface exuding a thin fluid. The right foot was cold and blue. There was a sore, as large as the palm of the hand, on the right buttock, and another on the left side of the back. The urine contained a trace of albumen. On Jan. 28 the right lower limb had become cold and blue as high as the knee. Death occurred on Jan. 30. The heart weighed 22 ounces, and there was great hypertrophy of the left ventricle. (Mr. Beck's *Case-books*, 1892, vol. i. p. 181.)

1191. The lower part of an abdominal aorta, together with the common iliac arteries. In its lower 6 cm. the aorta is occupied by a partly decolorised adherent clot, which on the left side is continued along the common iliac artery and into its external and internal branches. On the right side the clot does not extend beyond the bifurcation of the aorta. The inner coat of the aorta is in parts slightly thickened. 7371

From a woman, aged 57, who was under the care of Dr. Winstanley, of Haslemere. At the beginning of 1895 she complained of obscure abdominal pains for about 6 weeks. At the end of March an attack of influenza occurred, followed by herpes of the labia majora and pain and tenderness along the course of the vessels in both lower limbs. Gangrene of both lower extremities gradually supervened and extended on the right side as high as the knee and on the left side to above the knee. The patient died of exhaustion. Patient's father was stated to have died of "mortification of the legs"; her mother was said to have had one leg amputated for "white swelling," and to have died of "gangrene of the other leg."

ANEURISM.

An aneurism is a blood tumour communicating with an artery.

An aneurism may result from weakening of the arterial wall by disease (*spontaneous aneurism*) or may follow injury (*traumatic aneurism*).

Spontaneous Aneurisms.

The following varieties of Spontaneous Aneurisms are met with :—

1. *Fusiform Aneurism.*—A dilatation of a limited segment of an artery in its whole circumference (1193).
2. *Sacculated Aneurism.*—A pouch formed by the dilatation of a limited part of the circumference of an artery (1263). A sacculated aneurism may arise in part of an artery which is already the seat of a fusiform dilatation.
3. *Dissecting Aneurism.*—A space formed in the wall of an artery by blood forcing its way between the coats through a rupture of the internal layers (1235).

Of the above varieties, the sacculated aneurism is by far the most common, and is the only variety admitting of surgical interference.

Chronic endarteritis is the most important cause of spontaneous aneurism; it is the sole cause of fusiform and dissecting aneurisms, and the most common cause of sacculated aneurism. In the latter case a slight strain or other injury acting on the diseased artery is no doubt frequently the immediate cause of the formation of the aneurism. A sacculated aneurism may also result from embolic arteritis or from inflammation of the vessel-wall by extension from the surrounding tissues.

1. *Fusiform Aneurism.*—If a limited extent of an artery is affected in its whole circumference by any disease, such as chronic endarteritis, which seriously diminishes its elasticity, it becomes dilated, so that the expanded portion assumes a fusiform shape; or if the dilatation be considerable, and the length of artery affected be not too great, the dilated part will be globular in form. This condition is spoken of sometimes as "Aneurismal Dilatation" (1192), but when it forms a tumour of sufficient size to press upon surrounding structures the term "fusiform aneurism" is universally applied to it. If the dilatation reaches any considerable size, it very rarely maintains a regular fusiform shape. Almost invariably one part will yield more than another, and thus the aneurism assumes a more or less sacculated form (1207). Sometimes the sacculated projection communicates only by a narrow mouth with the fusiform dilatation, which it may finally greatly exceed in size, thus forming a combination of the fusiform and sacculated varieties.

The sac of a fusiform aneurism is formed by the wall of the artery, which usually presents well-marked evidences of chronic endarteritis. It contains no coagula, beyond, perhaps, such as may form in diseased areas of the inner coat or in secondary pouches (1193).

2. *Sacculated Aneurism.*—A pure sacculated aneurism results from a yielding of a comparatively limited portion of the wall of an artery (1195). A pouch-like

projection is first formed (1196), which gradually increases, while the opening into the vessel undergoes but little alteration. A large sac of globular or irregular form communicating with the artery by a more or less narrow opening thus results.

It will be noticed in most specimens that the thinness of the sac is not in proportion to its size, so that it is evident that the greater part of the tissue of the sac is of new formation. Microscopic examination of a sac, of any size, shows that the middle coat of the artery is not represented in it at all, or at most by a few scattered and isolated patches near the origin of the sac from the trunk. The structures forming the sac are, externally, dense fibroid tissue produced by an extremely chronic inflammatory process affecting the external coat, and internally a tissue composed of flat cells, and separated by fibrillated intercellular substance resembling in every respect the new tissue formed from the inner coat in chronic endarteritis. The wall often shows patches of calcification like those in diseased arteries. As the sac extends it frequently becomes very thin, and surrounding structures become involved in the chronic inflammatory process set up by its pressure. The sac is thus supplemented by a layer of dense fibroid tissue formed from the fascia surrounding it; and the viscera or other structures in the neighbourhood become firmly adherent to it and incorporated in its wall. The process may at last reach the skin or the wall of some hollow viscus or cavity, which is finally perforated, and the patient dies from hæmorrhage. Thus aneurisms may burst into the pleura (1213), trachea (1252), œsophagus (1226).

Bones exposed to the pressure of an aneurismal sac are deeply eroded. The sac becomes absorbed, so that the bare bone lies in actual contact with the blood (1199). The bone thus, as it were, enters into the formation of the sac. When the vertebræ are thus implicated, the intervertebral discs suffer much less than the bone. Flat bones are often perforated, as the sternum (1210). Nerves are at first stretched and irritated; but finally they may be so pressed upon as to become atrophied, and paralysis may result (1223). Pressure on the veins accompanying the affected arteries often causes their obliteration, which may give rise to gangrene of a limb (1275).

The contents of a sacculated aneurism are, proceeding from without inwards, decolorised fibrin arranged in concentric layers (usually spoken of as the "laminated clot"), fresh clot not decolorised or laminated, and liquid blood. The most external layers of the clot are the palest, and, in large aneurisms, are sometimes found to have undergone a fatty change and to have become soft, or even almost pulpy.

The tendency to coagulation of the blood on the diseased wall of the aneurism is constant: the clot tends to support the wall and prevent the rapid extension of the sac. If the deposit takes place to such an extent as to render the wall strong enough to resist the distending force of the heart, which is the only cause of the increase of an aneurism, spontaneous cure results, the sac becoming completely filled with firm clot (1198). The same result would be brought about by diminishing or completely cutting off the distending force of the heart, as in the various forms of surgical treatment. Many specimens of the larger aneurisms show certain pouches of the sac which have been cured by becoming completely filled with laminated clot, while in other parts the disease has been proceeding to its fatal termination.

It will be seen that one essential difference between a fusiform and a sacculated aneurism is that the whole blood-stream flows through the former, whilst in the latter the greater part of the contained blood is comparatively stagnant. Coagula, therefore, readily form in sacculated aneurisms, while it is just the reverse in the fusiform variety.

For the permanent cure of an aneurism it is necessary that the coagulation extend into the part of the artery from which the aneurism arises, and that this part of the vessel become permanently obliterated.

3. *Dissecting Aneurism.*—In a dissecting aneurism the diseased inner coat is suddenly ruptured, and the blood forces its way amongst the other coats. The rupture in the inner coat is always transverse. The blood most commonly splits

the middle coat into two layers (1238), but it may separate the outer coat from the middle (1235). After extending a certain distance the blood may find its way back into the vessel by again bursting through the inner coat, or the external coat may give way, causing fatal extravasation. Dissecting aneurism is almost exclusively found in the aorta, but it may extend beyond the bifurcation, or along one of the great branches of the arch.

1192. The first part of a thoracic aorta. A short distance from its origin the aorta presents a slight dilatation which affects the whole of its circumference, but chiefly the convex side, and extends to the upper end of the portion shown. The inner surface of the vessel is rendered very irregular by chronic endarteritis. 609

1192 A. The descending thoracic and nearly the whole length of the abdominal portions of an aorta. For a distance of 8 cm. above the origin of the renal arteries the vessel presents a very distinct fusiform dilatation. At a distance of 6 cm. above the origin of the cœliac axis, the diameter of the aorta measures 2·3 cm., whilst the maximum diameter of the dilated portion is 2·8 cm.

The transverse section of the superior mesenteric artery displays a thick yellow deposit beneath the intima of the left side of the vessel, by which the lumen is reduced to about one-half its natural size. Similar deposits are seen in the sections of the two renal arteries. 8788

From a man, aged 63, who was under the care of Mr. H. T. Price, of Maldon, for epigastric pain after food and constant feeling of abdominal discomfort. There was marked epigastric pulsation and the presence of an aneurism of the cœliac axis was suspected. The exact cause of death was obscure.

1193. The arch and part of the descending aorta, with portions of the trachea and œsophagus. The thoracic portion of the aorta is dilated into a large aneurismal sac, but unequally, the dilatation affecting chiefly the anterior and inner sides of the vessel. The upper limit of the sac, as seen from behind, is abrupt, and situated 2 cm. from the origin of the left subclavian artery. A protrusion of the main sac projects inwards, so as to displace the œsophagus to the right side and compress the right bronchus; at this point the sac appears to have given way, and an irregular mass of clot, which has been cut across in the preparation of the specimen, surrounds the lower part of the œsophagus.

1194. Part of the arch of an aorta. Immediately behind the origin of the innominate artery is a small aneurism of the aorta, affecting all its coats. The protrusion is of an irregularly oval form and about 1·5 cm. in its longer diameter; its mouth is deeply irregular in outline, and, except in one situation, the protrusion diminishes in size beyond it, so as externally to form an ill-defined rising on the posterior wall of the aorta. 1314

1195. Part of a descending thoracic aorta. From the vessel there project three aneurismal sacs, arranged in series, and nearly equidistant. The middle of these protrusions forms a small, somewhat conical pouch, the mouth of which is irregular in outline, and in places scarcely definable. The lowest protrusion presents similar characters. The highest is considerably larger, irregularly hemispherical, and completely occupied by coagulum, which, in its deepest part, is laminar and adherent to the interior of the sac. The lowest aneurism is also filled with coagulum. The intima of the aorta is thickened and deeply corrugated by opaque chronic inflammatory thickenings. (See Dr. Walshe's *Case-book*, Males, King, 1852, vol. vii. p. 138.) 4030

1196. Part of a descending thoracic aorta, extensively affected with chronic endarteritis. The inner surface of the vessel presents numerous irregular raised yellowish patches, produced by inflammatory thickenings at the inner coat.

The patches are smooth, and from one of them, below the middle of the specimen, the inner layers of the intima have been reflected in order to expose the softening inflammatory deposit beneath them. Above the last-mentioned patch the inner surface of the vessel presents a small depression corresponding with a bulging externally; this depression forms the centre of a thickened patch, which around the margin of the depression is distinctly puckered as if from scarring. 7796

The specimen illustrates the condition which is probably often the starting point of a sacculated aneurism. The patient had granular contracted kidneys.

1197. An abdominal aorta, with portions of the common iliac arteries. On the front of the aorta, reaching from below the cœliac axis to its bifurcation, there lies the sac of a sacculated aneurism somewhat ovate in shape, flattened antero-posteriorly, and in places presenting secondary protrusions, which give the exterior a lobulated character. The aorta has been laid open from behind to display the mouth of the sac. Immediately below the mouth of the sac, for a distance of about 3 cm., the inner coat is thickened from chronic inflammation. The orifices of the renal arteries are almost closed from the contraction succeeding the inflammatory changes. The aneurism has apparently formed in connection with the superior mesenteric artery, which passes directly forwards from the upper part of the sac.

1198. The ascending portion and arch of an aorta, together with a sacculated aneurism in vertical section. The aneurism springs from the right side of the ascending aorta; it is ovoidal in shape and communicates with the artery by a large opening which reaches upwards to the origin of the innominate artery and measures 4·5 cm. in diameter. The chief part of the aneurismal sac is below the level of its communication with the aorta, and this part is completely occupied by firm laminated clot, the layers of which are for the most part of a dark brown colour. The remainder of the interior of the sac in the neighbourhood of its mouth is occupied by a softer non-laminated coagulum, which has become completely decolorised, but in the recent state was black. The wall of the sac is thin, and from the appearance of its outer surface has evidently been separated by dissection from the surrounding structures. The whole part of the aorta shown presents on its inner surface large irregular patches of calcification, over many of which the endothelium has disappeared. The disease of the inner coat extends from the aorta a short distance into the innominate artery. 6475

From an old man, who died of hypertrophy of the prostate complicated with secondary inflammation of the kidneys. The existence of the aneurism was unsuspected during life.

1199. An aorta from the origin of the innominate artery, together with the bodies of some of the lower dorsal vertebræ, and an aneurism which has formed from the posterior wall of the aorta. The sac extends backwards on the left side to the roots of the vertebral spines, and is invested with an adherent layer of pleura. The sac is very nearly filled with clot, all parts of which are laminated, but most distinctly those which lie nearest to the wall of the sac. In the present condition of the specimen, the outer layers are rather darker than the inner, and present many laminæ of a brownish colour; this contrast is the reverse of that which was present in the recent state, when the more recent central part of the clot was much darker than the older peripheral layers. The sac is indistinguishably blended with the surrounding tissues, and evidently composed in part of the areolar tissue, thickened by chronic inflammation. The bodies of the vertebræ, where they project into the sac, are superficially eroded; the eroded surface itself is covered by a white membranous layer, formed probably in the repair of the eroded surface. The intervertebral discs are not obviously changed, and project prominently into the sac between the hollowed-out surfaces of the vertebral bodies. The mouth of the sac is oval, and about 2·5 cm. in its chief diameter. Below this the canal of the aorta is narrowed almost to obliteration by the projection of the sac on its sides.

1200. Part of a large buff-coloured coagulum from an aneurismal sac. Its convex surface is uneven and curved in a manner corresponding with the interior of the sac within which it lay. The coagulum has a laminated construction, being formed by closely-applied, yet readily separable, layers of fibrin, in general about 1 or 2 mm. in thickness; these laminæ themselves present in places a yet closer laminar structure, and are separated from one another by semitransparent lines of almost homogeneous substance. The arrangement of the fibrinous laminæ, as shown by the section, is not accurately concentric—those which are most exterior, and formerly lay immediately within the concavity of the sac, being more acutely curved than those which form the flattened or but slightly concave opposite surface, the intermediate layers being less and less convex as they have come to line the increasingly shallower cavity, and tapering at the edge so as to be semilunar in section. 2593

1201. Part of a coagulum from the sac of an aneurism. It is composed of pale yellow and completely decolorised layers of fibrin, the most external of which form arcs of smaller circles than those situated more deeply. Some of the oldest and more convex laminæ appear firm and horny. 3801

1202. A large discoid clot from a thoracic aneurism. It is about 10 cm. in diameter and 3·5 cm. in thickness at its central part. The fibrin forming it is of a pale buff-colour, at its older or more convex part tinged with red or orange, and arranged in closely adhering layers, for the most part very thin and delicate, yet tough and condensed, so as to make the whole firm and resisting. The edge of the coagulum is very uneven, and composed of ill-formed flakes and nodules of fibrin. 620

1203. Portion of a coagulum from the sac of an aneurism, partly separated by dissection into its component laminæ. At the upper part of the specimen, where the separation has not been made, the coagulum is firm, white, streaked with brownish yellow, and so compact as to present only faint traces of lamination; the coloured portion (probably that most recently formed) has a softer look, and is composed of a loose filamentous fibrinous substance. The separated laminæ are white, and form delicate, though firm, membranous films. 3777

Aneurisms of Special Arteries.

Aneurisms of the Thoracic Aorta.

These may arise at any part, but they are most common in the ascending aorta and the arch. They may be fusiform or sacculated, and very frequently consist of a saccular projection from a fusiform dilatation of the artery. Dissecting aneurisms occur almost exclusively in the aorta. When the aneurism arises from the ascending aorta it may project into the pericardium, and finally burst into it (1215). Thoracic aneurisms frequently reach an enormous size, and may even project from the cavity of the thorax either through the sternum or through the ribs near the spine, according to the part of the aorta from which they spring (1210). The parts pressed upon by the sac vary with the situation of the aneurism, the size of the sac, and the direction in which it is advancing. The most important are the pulmonary artery (1217), the vena cava superior and left innominate vein (1219), the left pneumogastric nerve and recurrent laryngeal (1223), the trachea (1222), the left bronchus (1223), and the œsophagus (1225). The aneurism may rupture into the heart (1216), pericardium (1215), pulmonary artery (1217), vena cava (1220), pleura (1213), lung (1239), trachea (1207), one of the bronchi (1223, 1225), or the œsophagus (1226).

1204. The arch of an aorta, together with parts of the large branches arising from it. The whole inner surface of the vessel is irregularly tuberculated and puckered as the result of chronic endarteritis. In many parts calcification has occurred, and the calcareous plates are exposed by loss of the overlying endothelium. The vessel does not present any general dilatation, but at the junction of the ascending aorta and the arch the wall of the vessel has yielded so as to cause a distinct bulging on the convex aspect of the vessel. The arterial wall in this situation is distinctly thinner than in other parts. The innominate artery and the origin of the subclavian are dilated. The mouth of the left common carotid is much constricted. The aortic valves are healthy. The coronary arteries are stenosed at their origin. 8049

From a man, aged 49, who was admitted into U. C. H., under the care of Dr. Roberts, on account of shortness of breath of 12 months' duration and pain in the clavicular region, extending down the upper limbs. On admission the patient was suffering from a severe attack of precordial pain, with profuse perspiration and throbbing sensations in the head. There was a pulsating tumour visible above the inner end of the right clavicle, with expansile pulsation and a slight thrill. The patient died 2½ months after leaving the hospital. The left ventricle was greatly hypertrophied and dilated; the valves were normal. (Dr. Roberts's *Case-books*, Males, 1898, p. 471.)

1205. The ascending part and arch of an aorta extensively affected with chronic endarteritis and presenting two sacculated aneurisms. The inner surface of the vessel is the seat of irregular raised patches, in many of which calcification has occurred. The larger aneurism, which is rounded in outline and about 7 cm. in diameter, arises immediately above the left posterior semilunar flap of the aortic valve, and communicates with the aorta by a rounded mouth 5 cm. in diameter.

A second much smaller aneurism, about the size of the last segment of the thumb, arises from the aorta close above the anterior semilunar flap and turns downwards and to the right above the right posterior flap. 2118 B

1206. Part of the ascending aorta, including the two posterior semilunar flaps of the aortic valve. From the left posterior sinus of Valsalva a sacculated aneurism has arisen, and forms a lobulated tumour projecting upwards for a distance of 4 cm. behind the ascending aorta, where it lay between that vessel and the auricles. The mouth of the aneurism, situated in the centre of the sinus of Valsalva, is nearly round, and about 4 mm. in diameter. The orifice of the left coronary artery is situated rather more than 1 cm. above and to the left of the mouth of the aneurism, and the artery is intimately connected with the anterior surface of the sac. The aorta is the seat of extensive chronic endarteritis. 8351

1207. The ascending portion and arch of an aorta, together with part of the trachea and its bifurcation. The aorta presents a well-marked fusiform dilatation, which extends from the aortic valve to a short distance beyond the origin of the left subclavian artery. Throughout the dilatation the inner coat is irregularly thickened by chronic endarteritis, and on the mesial aspect of the ascending portion the inner layers of the intima have given way so as to expose a softened inflammatory deposit beneath them. From the posterior aspect of the aortic arch, on a level with the origin of the left subclavian artery, a small sacculated aneurism has arisen. The aneurism has ruptured into the trachea by a transversely elongated aperture measuring 10 mm. by 5 mm., and situated in the upper part of a prominent bulging of the aneurism into the trachea. This bulging is

situated 1·5 cm. above the bifurcation of the trachea and in the line of the right bronchus.
8399

1208. The ascending portion and arch of an aorta, together with a sacculated aneurism in section. The aneurism springs from the anterior aspect of the ascending aorta; it forms an irregularly rounded tumour about 6 cm. in diameter, and communicates by a very large mouth with the interior of the aorta. The sac is incompletely filled with coagulum, the outer layers of which are of a dark brown colour and distinctly laminated. At nearly all parts a space exists between the sac of the aneurism and the coagulum within it, which, in its most peripheral layers, is calcified. The aorta is the seat of chronic endarteritis and presents numerous calcareous plates.
6714

From a man, aged 55, who was admitted into U. C. H., under the care of Dr. Ringer, on Jan. 29, 1890. For 15 years he had had repeated attacks of gout, and for 10 years shortness of breath on exertion and occasional pain in the chest. He had several times been in hospital before, and 18 months previously had been tapped for ascites. On admission there was difficulty in breathing; the liver was enlarged; there was fluid in the abdomen; expansile pulsation and thrill could be detected in the second right intercostal space. The urine contained albumen. Breathing became more difficult; the abdominal distension increased; and the legs became œdematous. Paracentesis was performed several times. Death occurred on Sept. 11, 1890. (Dr. Ringer's *Case-books*, Males, 1890, p. 532.)

1209. The heart and great vessels, with the larynx, trachea, thyroid body, and tongue. The heart is apparently quite healthy. Immediately above its valve the aorta dilates into a large aneurismal sac of irregular form, extending as far as the origin of the left subclavian. As viewed from the front, the sac is composed of three lobe-like portions, the largest of which corresponds with the dilated ascending portion and arch of the aorta; and the highest reaches upwards into the neck as far as the lower border of the thyroid cartilage. The inner border of the upper portion and the upper border of the main lobe rest against the thyroid body, both the lateral lobes of which are enlarged; the left contains a cyst. The innominate artery has been stretched and flattened out on the sac, and is obliterated as far as its bifurcation; its closure below is by a smooth membranous layer, apparently continuous with the inner coat of the vessel, and concave, as if adapted to the current of blood passing from the carotid into the subclavian artery, or *vice versâ*. Viewed from behind, the aneurism extends from the aorta to the larynx, from which it is separated by the hypertrophied thyroid gland; the left carotid artery on its surface has been laid open, and is partly obliterated. The left subclavian artery is of normal size and lies in a groove on the lower part of the sac, and though considerably compressed, is still pervious. The left pneumogastric nerve lies in connection with the sac from the level of the larynx to the aorta, and is deeply imbedded in the tissues forming the sac; its recurrent branch lies in the angle between the sac and the trachea, and seems to have been but little compressed.

The aorta leaves the lower part of the sac abruptly beyond the origin of the left subclavian. In the recent state the whole of the sac lying in the neck was filled with dense laminated fibrin.

The patient was a temperate woman, 41 years of age, admitted under the care of Mr. Hill, Sept. 30, 1879.

An enlargement of the throat, more especially on the left side, was observed when she was 14 years of age; and six years ago pulsation was noticed in the swelling. About three weeks before admission the left side of the neck began to increase in size very rapidly, and on admission there was considerable anæsthesia and loss of power in the left arm.

During life the swelling occupied the position of a thyroid tumour; its right and middle parts were slightly elevated in deglutition, but the left not at all.

The left lobe pulsated strongly on admission, but was not painful; the breathing was slightly impeded; left pupil smaller than the right; pulse at wrist imperceptible, and feeble on the temple.

The patient was discharged from the hospital in December and died from dyspnœa some weeks afterwards.

1210. The bones of a thorax, with the arch of the aorta, dried. From the upper part of the aortic arch there springs a large, oval, aneurismal sac. The anterior half of the sac projects directly forwards in the middle line, the upper two thirds of the sternum having been completely absorbed; the cartilages of the second and third ribs, however, project into the sac without having undergone any alteration in form.

The ascending aorta is considerably dilated, the dilated portion, like the wall of the aneurism, being hardened with irregular calcareous plates. The sac has a distinct, nearly circular mouth, about 4 cm. in diameter; the left subclavian artery arises from its back towards the left side. 1430

The patient was only 28 years of age.

1211. The arch of an aorta, together with part of the sternum and ribs, dried. The ascending aorta and the adjacent part of the arch are dilated, and from the dilated portion a sacculated aneurism projects forwards and upwards. The aneurism extends through the first intercostal space of the right side and deeply notches the adjacent border of the manubrium. The cartilages of the first and second ribs project prominently into the cavity of the aneurism. The opening produced by the aneurism in the chest-wall measures 2·5 cm. vertically, but the superficial part of the swelling considerably exceeds this and measures vertically 6 cm. 8503

From a man, aged 47, who was admitted into U. C. H. under the care of Sir T. Barlow, April 7, 1900. He had been engaged in very laborious work, and 18 months before admission severely bruised the front of the chest against a heavy wheel-barrow. For 12 months he had suffered from shortness of breath. There was a history of syphilis. On admission a pulsating tumour projected through the chest-wall below the right clavicle; it had only been noticed for 9 days. The aneurism rapidly increased in size, and effusion took place into the right pleura. Death occurred on May 6. (Sir T. Barlow's *Case-books*, 1900, vol. ii. p. 181.)

1212. An aorta, with the last dorsal and three upper lumbar vertebræ, dried. Immediately above the sinuses of Valsalva the aorta is expanded into an oval aneurism about 5 cm. in length, which extends as far as the origin of the innominate artery. From the aneurismal sac to the level of the last dorsal vertebra the aorta is of normal size, and presented but little sign of degeneration; below it terminates in a large aneurismal sac about 8 cm. in its transverse diameter. The bodies of the upper three lumbar vertebræ are deeply eroded from the pressure of the aneurism; the intervertebral discs were scarcely affected. 3673

The aneurism during life formed a large pulsating tumour in the umbilical and lower epigastric regions.

1213. Part of a vertebral column, with some of the ribs and part of the diaphragm and aorta, dried. In front of the spine, reaching from the tenth dorsal vertebra to the lower border of the first lumbar, is a large thin-walled aneurismal sac, the upper part of which is covered by the pleura. The mouth of the sac is oval and measures only 3 cm. in its longest diameter. The bodies of the last two dorsal and the first lumbar vertebræ, where they lie within the sac, are superficially eroded. An extensive process of the aneurismal sac has passed into the abdomen beneath the right ligamenta arcuata; above this the front of the sac is covered by the diaphragm. At the upper part of the right side of the sac is a ragged opening through which the aneurism burst into the pleura, causing rapid death from suffocation. 625

The patient had complained of persistent pain in the back, which was considered to arise from rheumatism. No pulsation was recognised during life.

1214. Eight upper dorsal vertebræ, with the arch of the aorta, dried. From the descending portion of the aorta there arises a large aneurismal sac which projects backwards through the wall of the thorax so as to be somewhat hour-glass-shaped. The sac communicates with the aorta by an oval opening about 4 cm. in its chief diameter. The bodies of the vertebræ opposite the aneurism are deeply eroded; the right transverse process and lamina of the fifth dorsal vertebra are completely destroyed. The ribs from the third to the sixth have also been destroyed. In the recent state the dura mater of the spinal cord was exposed. The trachea was adherent to the front of the sac. 623

From a man, 49 years of age, who had long complained of cough. Three years before death a pulsating swelling was noticed below the scapula, the swelling slowly increasing in size. After being a year in the hospital he was suddenly seized with fatal hæmoptysis, bringing up more than two quarts of blood.

An ulcerated opening was found after death between the trachea and the sac of the aneurism.

1215. Part of an aorta, with the contiguous part of the left ventricle. Above the semilunar valves the internal coat of the aorta is corrugated and thickened from chronic inflammatory changes; the thickening extends also for a short distance along the attached borders of the aortic valves. On the convexity of the vessel, a short distance above two of the semilunar valves, and in the midst of the thickening noticed, three small aneurismal protrusions have been formed. The largest of the protrusions, in which bristles have been placed, burst into the pericardium. The mouth of the sac is ragged and uneven, the inner coat ceasing abruptly as if ruptured. The destruction of the inner coat was probably due to softening, resulting from the chronic endarteritis. 616

The patient fell down dead in the street. The pericardium was found after death distended with blood. The heart was healthy.

1216. The upper portion of a heart, with part of the arch of the aorta, from the right side of which an aneurism has formed. The sac of the aneurism is somewhat globular in shape, and superiorly overlaps the arch as far as the root of the innominate artery; its mouth is situated immediately above the aortic valve.

A ragged aperture with thinned irregular edges marks the spot at which the aneurism burst into the right auricle. 4026

The patient died suddenly as he was walking in the street. (See 'Medical Times,' vol. ii. 1851, p. 586.)

1217. Part of a heart, with portions of the aorta and pulmonary artery. Projecting from the front of the aorta at its origin is the sac of an aneurism, about 4 cm. in diameter, which has slightly displaced the pulmonary artery (in the posterior wall of which it forms a prominent convex projection) forwards and to the left side. The mouth of the aneurism is transversely elliptical, about 2 cm. in diameter, and placed immediately above the semilunar valves. The aneurism communicates with the pulmonary artery by a well-defined circular aperture in the summit of the eminence noticed, the communication being 7 mm. in diameter, and its edges rounded and smooth. In one situation the wall of the aneurism is exceedingly thin, and formed apparently only by the visceral pericardium. A short distance above the aperture of communication there is a small patch of chronic endarteritis in the pulmonary artery; similar patches exist also within the aorta in the neighbourhood of its valves. The heart and rest of the aorta are apparently healthy. 2254

The disease was not discovered during life.

1218. Part of an aorta, with the contiguous part of the heart and a portion of the trachea. The ascending portion and ~~arch of the aorta~~ are dilated into a large globular sac about 8 cm. in diameter, from the highest part of which the large branches arise. The dilatation ceases somewhat abruptly beyond the left subclavian artery. The interior of the dilated portion, as well as the vessel beyond, is very uneven, thickened, and irregularly raised by chronic endarteritis. The innominate artery also presents a general fusiform dilatation. The aortic valves and pulmonary artery are healthy. 4036

From a patient under the care of Dr. Walshe, Jan. 13, 1852.

There was intense pain in the upper sternal and left infraclavicular regions extending to the axilla and radiating in other directions. No murmur in heart or aorta in front; distinct systolic, short, superficial murmur in the course of the aorta about the inferior angle of the scapula. No prominence or impulse to be felt externally. No thrill. Percussion dull in left interscapular region, and slightly so in the right. Dulness about the first and second left costal cartilages in front and great pain on percussion. Respiration in and below left interscapular region peculiarly jerking in rhythm and of very sharp blowing quality.

March 31.—Signs essentially the same, but in addition an impulse visible, as also a very slight general prominence about the top of the sternum and first and second costal cartilages. No thrill or murmur over the aneurism or heart. Double sound over prominence; louder in both its divisions than at the heart.

April 26.—Prominence more obvious. Dulness extended. The patient committed suicide by cutting his throat about a fortnight afterwards.

1219. A heart, with the arch of the aorta and a large sacculated aneurism which has arisen from the latter behind and to the right side of the innominate artery. The mouth of the sac apparently involves the lower and right side of the innominate artery, and the adjoining portion of the aortic arch. The sac is oval and about 10 cm. in diameter; it overlaps the first part of the ascending aorta and has displaced the trachea some way to the left. The superior vena cava rests on the sac posteriorly, and is adherent to it. Immediately behind and to the mesial side of the left subclavian artery an abnormal branch (probably the vertebral) arises from the aorta. 4246

1220. A heart, together with the great vessels. The ascending aorta and the greater part of the arch are involved in a large aneurism, the greatest extension of which is upwards and to the right. The superior vena cava, which lies on the posterior surface of the aneurismal sac, has been laid open; in its anterior wall is a diamond-shaped opening by which the vein communicates with the interior of the aneurism; the opening is nearly 1 cm. in length, and its edges, although thin, are rounded; the lower end of the opening is 3·5 cm. above the termination of the vena cava. From a short distance beyond its termination the left innominate vein is impervious and inseparably blended with the upper part of the wall of the aneurism. The descending thoracic aorta is extensively diseased, and near the lower end of the part preserved an extensive deposit of laminated clot is adherent to the inner surface of the vessel. The heart is large, and in the recent state its substance was soft, and the right cavities were dilated. 6519

From a man, aged 61, who was admitted into U. C. H., under the care of Dr. Ringer, on Oct. 20, 1887, complaining of pain in the chest and difficulty in breathing of 8 months' duration. On admission the face was deeply cyanosed, especially on the right side. The right pupil was slightly larger than the left; both sides of the face perspired freely. The neck was surrounded by a collar of œdema, and the right arm was greatly swollen and the chest-wall slightly œdematous. The respirations were 40 and laboured. In the 2nd and 3rd right intercostal spaces there was deficient resonance and visible pulsation; over the same area a systolic thrill could be felt and a continuous harsh murmur was audible. Cyanosis increased and death occurred on Oct. 21. (Arkle & Bradford, Clin. Soc. Trans. 1889, vol. xxii. p. 69.)

1221. A heart, with parts of the great vessels, together with the trachea and its bifurcation. Springing from the right and posterior aspects of the junction of the ascending aorta and arch is a large sacculated aneurism, which communicates with the aorta by a very wide rounded opening and is partly filled with coagulum. The aneurism extends as far as the origin of the innominate artery and rises as high as the arch formed by this vessel and the subclavian. Beyond the origin of the aneurism the aorta is the seat of chronic endarteritis.

The superior vena cava lies on the posterior surface of the aneurism; its inner surface is covered with a thin layer of adherent clot, and a short distance above its termination the clot in the aneurism is exposed by ulceration of the wall of the vein and subjacent sac. The opening is irregular and measures 16 mm. in its longer, transverse diameter. The right subclavian vein at its termination is blocked with coagulum; the left innominate vein appears to have been obliterated.

In the anterior wall of the trachea and the adjacent part of the right bronchus is an ulcerated surface measuring 3·5 cm. by 1·5 cm. In the upper border of the ulcer, one of the cartilaginous rings of the trachea is freely exposed, and immediately below this the aneurism has burst into the air-passage.

The outer and posterior aspects of the sac are inseparably connected with adherent pleura and lung. 8065

W. M., a brewer's drayman, aged 40, was admitted into U. C. H., under the care of Dr. Ringer, on June 20, 1898, complaining of cough, shortness of breath, a feeling of "tightness in the chest," and tenderness in front. On admission a pulsating tumour occupied the right half of the manubrium and the inner part of the 1st, 2nd, and 3rd intercostal spaces of the right side. No thrill could be felt or murmur heard in the tumour. There was extensive dulness with weak breathing over the whole of the right side of the chest. There was increasing cyanosis and some œdema of the face and neck. On July 2, during a sudden attack of dyspnœa, a small quantity of blood was expectorated and the patient died suddenly. (Dr. Ringer's *Case-books*, 1898, Males, p. 518.)

1222. The arch of an aorta, with a small portion of the front of the trachea, dried. About 4 cm. from the origin of the aorta, and arising from its right side, is the sac of an aneurism extending over the whole of the arch and involving its great branches.

The innominate artery is exceedingly short, from the incorporation of its lower part with the aneurismal sac; all the branches have been thickened and made opaque and hard by calcareous deposits. Posteriorly the sac has compressed and become adherent to the trachea; and between the trachea and the aneurism a free communication exists. The cartilages bounding the largest of the apertures have been notched by ulceration previously to the rupture of the sac; the other apertures are most probably artificial. 5363 A

The patient died from the bursting of the aneurism into the trachea. From the position of the sac it is evident that a large pulsating tumour must have existed during life in the suprasternal depression and beneath the sterno-clavicular articulation of the right side. The specimen illustrates how an aneurism of the aorta may give rise to such symptoms as to be mistaken for one of the innominate artery.

1223. The arch of an aorta, with the bifurcation of the trachea and the left pneumogastric nerve. Springing from the lower aspect of the arch, and from the greater length also of the ascending aorta, is the sac of a large aneurism, which has burst posteriorly into the left bronchus.

The sac is unevenly oval in shape and occupies the whole concavity of the arch; beyond which it projects on either side, but chiefly on the right, where the trachea is separated by it from the aorta for about 4 cm. Anteriorly the ascending aorta has been laid open. The section of its wall displays the inner coat thickened and raised in low wide-spread swellings by endarteritis. The aneurismal sac contains a mass of loosely laminated fibrin; on the right side it is adherent to the termination of the trachea, and has been opened in dissecting the specimen; the fibrin within it is here firmly adherent to the interior. A second opening has been cut in the back of the sac on the other side of the trachea.

The aperture in the left bronchus is oval, about 5 mm. in length, placed across the bronchus, and has a shreddy ulcerated border; the bronchus is but little altered in shape.

The pneumogastric nerve is adherent to the front of the sac, immediately below the origin of the left subclavian, and has apparently been compressed by it. 1523

1224. The arch and descending thoracic aorta, and portions of the trachea and œsophagus. An aneurism has formed on the front of the aorta about 5 cm. beyond the origin of the left subclavian artery and below the bifurcation of the trachea. The sac is somewhat ovoidal and lies behind and below the left bronchus, with which it has become intimately adherent, the surrounding tissues being consolidated and combined with it. The œsophagus is displaced to the right side, and its lumen presents a convex prominence in the position of the aneurism.

The aneurism communicates with the interior of the aorta by an oval mouth 2·5 cm. in length. All the coats of the vessel are apparently prolonged into the sac. Immediately beyond its mouth the sac expands so as to overlap the adjoining portion of the vessel.

Below the mouth of the aneurism the wall of the aorta presents a semilunar fold, as though a second protrusion were in process of formation. The interior of the aorta is in several places wrinkled by irregular thickening of its inner coat.

In the back of the left bronchus is a large, irregular, ulcerated aperture, imperfectly closed with a layer of fibrin, through which fatal hæmorrhage occurred from the aneurism. The left vagus nerve passes through the consolidated areolar tissue forming the sac of the aneurism. 5363 B

The patient, a convict-warder, aged 38, was admitted into St. Bartholomew's Hospital, Chatham, Sept. 7, 1870, suffering from pleurisy in the left side. After a few days he was better, but general dulness in the left side of the thorax remained, and respiratory sounds were scarcely audible. Obstinate vomiting set in, having no relation to the time of taking food, and unamenable to treatment. Repeated physical examination of the thorax and abdomen gave no evidence of disease beyond those above noted. On Oct. 21, whilst attending the ministrations of his priest, he was seized with sudden and excessive hæmoptysis, from which he died.

After death both the lungs were found adherent; the right was emphysematous, the left in an advanced stage of pneumonia. The heart, liver, and kidneys were healthy. The stomach contained about a pint of black clotted blood (swallowed ?); there was no ulcer or other disease. The œsophagus was adherent to the aneurism, but was healthy. The vomiting possibly arose from irritation of the right pneumogastric. The physical signs observed in the left side were due to obstruction to the entrance of air from pressure on the left bronchus.

1225. Part of a thoracic aorta, together with portions of the œsophagus and the trachea with its bifurcation. A small sacculated aneurism springs from the aorta at a distance of 3 cm. beyond the origin of the left subclavian artery, and communicates with the aorta by a relatively large rounded mouth. The aorta, especially in its upper part, is the seat of chronic endarteritis.

The aneurism has forced its way between the œsophagus and the trachea, projecting into both of them. In the œsophagus the bulging formed by the aneurism takes the form of a smooth rounded elevation, over which the mucous membrane is smoothly stretched, but not ulcerated. A section through the projection of the aneurism into the œsophagus displays the laminated clot by which the sac is almost completely filled. The projection of the aneurism into the trachea, immediately above its bifurcation, is much less evident than that into the œsophagus. In the right bronchus, ulceration has occurred followed by rupture; the perforation is nearly round, and measures about 5 mm. in diameter. 7436

From a man, aged 42, who was admitted into U. C. H., under the care of Dr. Roberts, Feb. 3, 1895. On the evening before admission, while at work, a sudden fit of coughing occurred attended with a choking sensation and the expectoration of one or two mouthfuls of blood. The previous health had been good. On admission the patient was collapsed and cyanosed, and the breathing was rapid and shallow. Large bubbling rales were audible on both sides of the chest. On several occasions small quantities of blood were expectorated mixed with yellowish viscid sputum. There were no characteristic physical signs in the chest. On March 7 death occurred suddenly from hæmoptysis while the patient was dressing himself. (Dr. Roberts's *Case-books*, 1895, vol. i. p. 228.)

1226. Part of an aorta, with the bifurcation of the trachea and a portion of the œsophagus. Nearly 3 cm. beyond the origin of the left subclavian artery the posterior and right wall of the aorta has been dilated into the sac of an aneurism which has become adherent to and burst into the œsophagus about 2 cm. above the bifurcation of the trachea. The sac of the aneurism is globular, and has a diameter of about 5 cm.; its interior is lined with a thin laminated fibrinous layer, which appears in great part to have been removed. A piece of glass has been passed from the aneurism into the œsophagus, through the aperture noticed; the ulcerated opening is about 8 mm. in diameter; the ulceration has spread slightly further in the mucous membrane than in the submucous and muscular tissue. 5252

A gentleman, aged 38, of active habits, had some pain about his chest for three months before death; this increased: somewhat stridulous voice, increased dulness, but very few symptoms. He became worse and suddenly vomited a large quantity of blood and died. (Trans. Path. Soc. 1866, vol. xvii. p. 110.)

1227. Part of a thoracic aorta, together with parts of the trachea and œsophagus. The interior of the aorta is throughout deeply corrugated and raised by thickening of its coats in irregularly oval circular swellings, which are in places spotted with yellow calcareous deposits. A short distance beyond the origin of the left subclavian artery, and from the right side of the aorta, an aneurismal sac has been formed, the mouth of which includes about half the circumference of the vessel.

The sac diminishes in size from its mouth so as to be somewhat bell-shaped; at its apex is a longitudinal rent 2·5 cm. in length, by which it opens into the contiguous part of the œsophagus. Opposite the rupture the sac is adherent to the œsophagus, the torn edges of which are thinned and constituted only by the mucous and submucous coats on which the sac of the aneurism appears immediately to rest, the muscular coat having been destroyed by ulceration. The mouths of the large branches are converted into slit-like apertures by the chronic inflammation about them. 4035

1228. The arch of an aorta, with the roots of its branches. The aorta presents the ordinary appearances of advanced endarteritis. Immediately beyond the origin of the left subclavian branch is an irregular opening, due either to rupture or ulceration of the inner and middle coats. The opening is situated at the upper and anterior side of the vessel, has ragged undermined margins, and communicates with an irregular cavity, the walls of which are apparently composed of the stretched external coat, inseparably blended with the surrounding tissues. The cavity is surrounded by a dense mass composed of lung and bronchial glands combined by inflammatory products. There is distinct bulging of the left posterior sinus of Valsalva. 615

The patient was a Creole, about 50 years of age, whose complaint was ascribed to dyspepsia. He died suddenly, having a few hours previously declared himself quite well. The aorta was found adherent to one of the lobes of the lung, and a cyst, the walls of which were lined with layers of coagulum, was formed in the substance of the lung; this sac had burst into the cavity of the thorax. There were old adhesions between the heart and pericardium. During life no remarkable pulsation had been observed.

1229. Part of a thoracic aorta, together with the upper part of the left lung. The aortic arch presents a general dilatation, from the upper part of which the large branches arise; the latter are at their origins diminished in size by thickening of the surrounding part of the aorta. The whole of the dilatation presents a raised interior from irregular thickening and degeneration of its inner coat. From the fore part of the general dilatation, opposite the root of the subclavian artery, a rounded sac projects against and is adherent to the lung; at the deepest part of this sac the walls of the aneurism have given way, the blood having escaped for some distance into the pulmonary tissue. The pleura over this part is thickened and covered with inflammatory exudation, long shreds of which hang from its surface. 2259

1230. Part of a spinal column, with the ribs and aorta, dried. The aorta, from immediately beyond its arch to the origin of the superior mesenteric artery, is dilated into a wide sacculated tube, and increased in length, describing a long curve to the left. The dilatation is greatest immediately above the diaphragm. At the summit of the curvature the left side of the sac is extremely thin, and presents a large aperture, through which the aneurism probably ruptured into the left pleura. Numerous opaque calcareous patches are scattered over the entire length of the vessel. 4948

1231. The whole of a thoracic, with part of the abdominal, aorta, and some of the lower dorsal vertebræ.

A globular aneurismal sac, about 8 cm. in diameter, has formed on the posterior wall and right side of the aorta immediately above the diaphragm.

Posteriorly the sac rests within a deep and irregular excavation which it has formed in the vertebræ lying behind it. The neck of the sac involves about two thirds of the circumference of the aorta and nearly 4 cm. of its length; posteriorly its limit is ill defined. On its outer aspect the sac has become adherent to the contiguous portion of the right lung. The interior of the sac appears to have been lined throughout with fibrin, which is accumulated chiefly within the anterior concavity of the sac, where it forms a thick, though separable, discoid mass. The bodies of the vertebræ have been destroyed with much irregularity; the body of the highest projects unaltered into the upper part of the sac; those below are deeply absorbed, and the two next succeeding almost wholly removed; the resulting excavation is ridged across its middle by the remains of the intervertebral substance between the bodies. The arches of the vertebræ have been removed; no change has taken place in the form of the spinal canal. 1524

1232. Part of a descending thoracic aorta, together with some of the dorsal vertebræ and parts of the corresponding ribs of the left side. From the posterior aspect of the aorta a large sacculated aneurism has arisen, measuring 17 cm. from above down and 13 cm. from side to side. The mouth of the sac is oval and measures 7 cm. in length; the interior of the sac is partly filled with laminated clot. The extension of the aneurism has taken place more to the left than to the right side, and its surface is covered with adherent pleura and lung. The bodies of six of the dorsal vertebræ have been more or less extensively destroyed by the aneurism, whilst the corresponding intervertebral discs, which have escaped destruction, form a series of prominent projections into the interior of the sac. Posteriorly, on the left side, the aneurism bulges through the intercostal spaces, and two of the ribs have been destroyed in their whole thickness. The spinal canal has been opened by the removal of the arches, and the cord with its membranes removed. It is thus seen that the pedicles of several of the vertebræ have been destroyed, and for a distance of 10 cm. the clot in the aneurism is exposed in the left wall of the spinal canal. Around the mouth of the aneurism the inner surface of the aorta is rendered irregular by chronic endarteritis. 6656

From a soldier, aged 28, who was admitted into U. C. H., under the care of Dr. Poore, Sept. 12, 1890. For a year he had suffered from pain in the back, thought to be lumbago. On Aug. 22, 1890, on trying to get out of bed he found he had lost all power in the lower limbs, and could not pass his water; there was also loss of control over the motions. His condition remained unchanged and the urine was drawn off with a catheter. On admission there was complete loss of power in the lower limbs, and complete loss of sensation in the lower limbs and in the trunk as high as the ensiform cartilage in front, the 8th dorsal spine behind, and the 7th intercostal space in the mid-axillary lines. Knee-jerks were absent, and the superficial reflexes of the lower limbs abolished. There was a distinct bulging as large as the palm of the hand to the left side of the dorsal spine; it was soft and semi-fluctuating and the seat of slight pulsation. There was a large bed-sore over the sacrum, and the urine was offensive. The swelling in the back increased both in area and prominence, and the legs became œdematous. Several attacks of syncope occurred, in one of which the patient died suddenly on Oct. 6. The left pleura contained a large excess of blood-stained fluid. The aneurism was extensively adherent to the left lung and the ribs; the mitral valve was thickened. (Dr. Poore's *Case-books*, Males, 1890, vol. i. p. 610.)

1233. The arch of an aorta together with the large branches. From the aorta immediately in front of the origin of the innominate artery there arises a sacculated aneurism, which projects upwards nearly 2 cm. above the bifurcation of the innominate. The sac is oval in shape, and measures 8 cm. by 5·5 cm. The interior of the sac, as displayed by the section, is filled with clot; the peripheral layers of the clot are laminated and brownish in colour, whilst the part nearest to the mouth of the sac is not laminated, and in the present condition of the specimen is pale in colour. The innominate artery is distinctly dilated, and at its origin involved in the aneurism. The lumen of the part of the left common carotid preserved, measuring 7 cm. in length, is completely filled with firm coagulum, which extends down to the origin of the vessel, but not into the aorta; at its upper end the vessel is completely obliterated as the result of the application of a ligature. The aorta shows well-marked signs of chronic endarteritis. 7840

From a woman, aged 61, who was under the care of Dr. A. H. Robinson, in the Mile End Infirmary, in 1890. She had been under treatment for 3 years for symptoms of aortic aneurism. In July 1890 there was marked pulsation with a bruit in the suprasternal notch; there was also irritating cough and inability to lie down. After 4 months' unsuccessful treatment by rest and iodide of potassium, the left common carotid artery was tied by Mr. Heath without an anæsthetic. The difficulty in breathing was considerably relieved by the operation, and in February 1891 the tumour in the suprasternal notch was smaller. The patient left the Infirmary on Aug. 8, 1891; she was admitted into the London Hospital on Sept. 3, with a pulsating tumour at the inner end of the right clavicle, and died suddenly on Nov. 29, 1891. (Heath, B. M. J. 1898, vol. i. p. 478.)

1234. The arch of an aorta with the large branches. On the junction of the ascending aorta and the arch is situated a sacculated aneurism, which is oval in shape, and measures 8 cm. in its longest diameter. The mouth of the sac extends up to, but does not involve, the origin of the left common carotid artery. The origin of the innominate is, however, included in the mouth of the aneurism; the anterior wall of the vessel is, in its whole length, lost in the sac, whilst the posterior aspect is dilated, forming, as it were, a secondary pouch on the posterior and inner aspect of the aneurism. The sac of the aneurism, as displayed by the section, is partly filled with laminated clot, having a maximum thickness of 2 cm. From the sac a delicate cord-like clot extends into the innominate artery.

At a distance of 8 cm. above its origin, the left common carotid artery is obliterated as the result of changes following the application of a ligature; below this level the vessel is plugged with coagulum to within 1 cm. of its origin.

The aorta is the seat of well-marked endarteritis. 8212

Microscopic Structure.—The wall of the sac is thin and composed of fibrous tissue, containing but few cells. There is a small round-cell infiltration around the vessels of the wall. Lining the sac is a thick layer of laminated fibrinous material; internal to this a similar material forms a more open meshwork filled with blood-cells and infiltrated with leucocytes.

From a man, aged 36, who was admitted into U. C. H., under the care of Dr. Roberts, Nov. 4, 1898, complaining of pain in the upper part of the chest, especially on the right side, of about 7 months' duration. There was slight bulging of the inner ends of the first and second intercostal spaces of the right side, and undue prominence of the right clavicle. Over the same area there was impairment of resonance and expansile pulsation.

On. Jan. 18, 1899, Mr. Heath tied the left common carotid artery with silk, local anæsthesia being produced by the infiltration method with a solution of eucaine, 1 in 1000. The pulsation in the aneurism is noted as being slightly less on the fifth day after the operation. After Feb. 16 the temperature was constantly and irregularly elevated, there was copious, fetid, purulent expectoration, in which, on April 4, tubercle bacilli were found. The patient rapidly emaciated, was delirious at times, and died on April 21. The heart was normal; both lungs were universally adherent and were infiltrated with tubercle. (James Smith, Dr. Roberts's *Case-books*, 1899.)

1235. Part of a heart, with part of the arch of the aorta. The inner and middle coats of the aorta have been ruptured transversely 2·5 cm. beyond the semilunar valves to the extent of at least half the circumference of the vessel. Around the rent the external coat is extensively separated, as if by dissection, from the subjacent coats in the whole extent of the portion of aorta shown.

The inner surface of the aorta presents numerous raised yellow patches resulting from fatty degeneration of inflammatory deposits in the inner coat. 2176

1236. The arch and portion of the descending thoracic aorta, which is the seat of a dissecting aneurism. The inner coat is throughout thickened and tuberculated from chronic inflammation; the inflammatory products have in many situations undergone calcification. A short distance above the semilunar valves the internal coat has been ruptured for 5 cm. The rent has occurred on the anterior aspect of the aorta, and, except towards its proximal end, runs in correspondence with the direction of the vessel. The middle coat where exposed is rough and uneven; some of its deepest transverse fibres have been detached with the internal coat; the edges of the latter are curled inwards. 3669

1237. A heart, with the arch of the aorta and parts of the trachea and œsophagus, the aorta being the seat of a dissecting aneurism. The aorta has been laid open along its anterior aspect, as far as a short way beyond the origin of its main branches; and the pulmonary artery has been partly divided. About 3 cm. above the semilunar valves the inner and middle coats of the aorta are torn transversely, the rent extending almost completely round the vessel; a short distance beyond this is a second transverse rent. The internal and middle coats have been separated from the outer, by the blood, in the whole length of the part of the aorta preserved, but in the lowest part the separation only involves the convex aspect. In cutting open the aorta a considerable length of the inner and middle coats has been divided longitudinally; the external coat seems to have been considerably stretched.

The dissecting process has extended a short way upwards in the walls of the innominate and left subclavian arteries. 4138

1238. A heart, with the arch of the aorta, the coats of the aorta being extensively ruptured in a dissecting aneurism. The inner, and incompletely, the middle, coats of the aorta have been ruptured transversely about 5 cm. above its origin. From this rent the blood has forced its way upwards and downwards between the coats of the artery, upwards to beyond the origin of the left subclavian and downwards to the sinuses of Valsalva. An irregular cut has been made with a scalpel from the transverse rent to the level of the valves, and one of the flaps thus made turned backwards so as to expose the external coat; in the part of the external coat thus exposed is a small aperture through which a bristle has been passed; this opens externally into the pericardium. The intrapericardial portion of the aorta and the whole surface of the heart are covered with a thin layer of coagulated blood. The heart is apparently healthy; the flaps of the aortic valve (of which there are but two) are slightly more opaque than natural; there are scarcely any traces of endarteritis in the vessel.

About 2 cm. beyond the origin of the left subclavian is a small transverse slit in the inner coat of the aorta, through which the blood had burst again into the lumen. 5322

From a man, 57 years of age, who died suddenly whilst walking in the street. After death the pericardium was found full of blood.

1239, 1240. An aorta with its bifurcation and the sac of a large dissecting aneurism. The sac extends upwards as far as the origin of the left subclavian, and downwards passes from the aorta along the left common iliac artery as far as its bifurcation. In its upper part the aneurism forms a large tubular cavity having a transverse diameter of more than 5 cm. At about the level of the origin of the superior mesenteric artery the sac becomes narrowed, so as to form a tube very little larger than the aorta itself. The sac is lined by a smooth membrane, so that its inner surface resembles that of a fibroid artery; in parts it is covered with a thin irregular layer of coagulum, which forms a considerable mass a short distance above the lower extremity of the sac. In almost the whole of its extent the sac of the dissecting aneurism lies to the left of and rather behind the aorta itself; above it communicates with the aorta by a small rounded aperture a short distance beyond the origin of the left subclavian, and below by a slit-like opening with the left common iliac artery immediately above its bifurcation. The left intercostal, renal, and lumbar vessels, with the inferior mesenteric, arise from the aneurismal sac, opposite each of them being an aperture into the aorta.

The upper part of the aneurism is, on the left side, extensively covered by adherent lung; on the right side, at a somewhat lower level, is a large pouch which is covered with adherent pleura and lung, the latter being infiltrated with blood. The aorta, especially in its abdominal portion, presents evidences of chronic endarteritis. 7675

From a woman, aged 43, who was admitted into U. C. H., in Jan. 1896, on account of pain in the middle of the chest, which came on suddenly ten days before admission, and was so severe as to cause her to fall. Several slighter attacks of pain occurred while she was in the hospital; the pain usually began in the chest and extended down the left side of the abdomen into the thigh. There was constant rigidity of the muscles of the left side of the abdominal wall. A systolic murmur was heard over the whole cardiac area. Thirteen days after the first attack of pain signs of left-sided pleural effusion developed; 33 ounces of pure blood were withdrawn with an aspirator. No recurrence of the hæmothorax followed, and in 2 months the patient left the hospital and returned to her household work, being nearly free from pain. Nine months after the onset of the illness, the patient had an acute attack of pain in the chest and abdomen, and fainted. On the following day, while being brought to the hospital in a cab, she suddenly coughed up a little bright blood, and died immediately. At the *post-mortem* examination the base of the left pleural cavity was found to be obliterated by adhesion. The pouch of the aneurism, which projected into the base of the right lung, had leaked, and the lung-tissue was infiltrated with blood. The right pleural cavity contained about 3 pints of blood, which had oozed into it from the surface of the lung. (Dr. G. B. Hunt, Clin. Soc. Trans. vol. xxx. 1897, p. 200.)

Aneurisms of the Abdominal Aorta and its branches.

These most commonly spring from the aorta, near the origin of one of the large branches. The cœliac axis is frequently involved in the dilatation. Less commonly the aneurism is situated at the bifurcation (1244). The most severe effects of the pressure of the aneurism are shown by erosion of the bodies of the vertebræ. The mobility of the abdominal viscera usually prevents their being much affected by the pressure of the aneurism until late in the disease. The sac may reach a great size, and finally rupture into the subperitoneal tissue (1244), peritoneal cavity, intestine, or pleura (1242).

Occasionally the aneurism may spring from one of the large branches, the main trunk being unaffected. The artery most commonly affected is the superior mesenteric (1248).

1241. The lower part of an abdominal aorta, with the common iliac arteries, laid open from behind.

The anterior wall of the aorta near its bifurcation is protruded forwards so as to form a pouch on its exterior about 4 cm. in diameter. The protrusion is filled with a firm oval coagulum; the mouth of the left common iliac artery is occluded by similar firm coagulum. A third coagulum lies in the end of the right common iliac artery, which is also bulged forwards into a shallow aneurismal sac.

The inner coat of the several vessels is thickened and mottled with opaque white inflammatory deposits; in places these have undergone calcification. The branches arising from the upper end of the portion of aorta shown are considerably diminished in size beyond their origins by thickening of their inner coats, and open by funnel-shaped mouths into the main vessel. 3575

1242. Part of a descending thoracic, with the commencement of the abdominal, aorta (laid open from behind), and the sac of an aneurism which arises from the vessel where it lies between the pillars of the diaphragm. The form of the sac appears to have been almost globular; its mouth involves nearly the posterior half of the circumference of the vessel. The openings in the sac are apparently artificial. The inner coat of the aorta is thickened by chronic endarteritis. 5373

From a man, about 30 years of age, of dissipated habits. He suffered from obstinate constipation and complained of spasm in the abdomen; his special disease was detected on examination. After having been a day or two in the hospital he died suddenly in trying to rise. After death the aneurism was found to have ruptured into the left pleura.

1243. Part of an aorta, including portions of its descending thoracic and abdominal divisions, with parts of the lumbar vertebræ. From the posterior wall of the aorta, above the level of the origin of the cœliac axis, an aneurism has been formed, by the pressure of which much of the intervertebral disc behind it, together with portions of the bodies above and below, have been absorbed.

The sac of the aneurism extends backwards for 2·5 cm., and opens into the aorta by a wide mouth somewhat less in its greatest diameter. 2077

1244. A sacrum, together with the last two lumbar vertebræ and the termination of the aorta. The aorta just above the bifurcation has been dilated into an aneurism, which has ruptured. Around the extravasated blood a sac-wall, composed of the thickened connective tissue of the part, has been formed, the cavity reaching upwards so as to surround the termination of the aorta and the aneurism, and extending downwards in the right half of the hollow of the sacrum to its lower border. The termination of the vena cava and the common iliac veins and arteries are embedded in the tissue of the sac-wall. 621

From an aged female subject brought into the dissecting-room. Blood was found in the abdomen.

1245. An abdominal aorta, with the lower part of its thoracic division, and the last two dorsal and upper four lumbar vertebræ. A large aneurism has been formed from the posterior wall of the aorta near the junction of its thoracic and abdominal parts.

The sac of the aneurism is bilobed, extending downwards on each side of the spinal column; the portion on the left side is much the larger, and reaches from the body of the eleventh dorsal to the lower margin of the fourth lumbar vertebra. The central portion of the aneurism lies on the front of the twelfth dorsal and upper two lumbar vertebræ, considerable portions of the bodies of which have been absorbed; the intervertebral discs, however, remain intact, and project from the excavated surface.

The wall of the sac is composed of dense fibrous tissue, and appears to have been closely united with the tissues around. The interior of the sac is lined with laminated coagulum, in some situations nearly 2 cm. thick. The aperture by which the aneurism communicates with the aorta involves the posterior half of the circumference of the vessel. 622

The patient suffered from the disease for more than a year, but the existence of aneurism was not suspected. No pulsation was felt. The patient experienced most excruciating pain in the lower part of the abdomen, such as to make him start out of bed and scream. He had a slight stricture, and passed sand in his urine. A few days before he died a large tumour presented itself on the left side of the abdomen. He died with symptoms of internal hæmorrhage. At the *post mortem* examination blood was found effused between the abdominal muscles and peritoneum, and the viscera were covered with coagula. The tumour had given way in two places. The sac on the right side was full of laminated clot. The kidneys were moulded into an unnatural shape by the pressure of the aneurism. The spleen and pancreas adhered to the sac so as to form part of its parietes, and a firm clot extended into the pelvis, compressing the bladder. No calcification was seen in the arteries. Heart healthy.

1246. A portion of an abdominal aorta, with the right common iliac artery, in section. From the front of the aorta, immediately above its bifurcation, there projects a hemispherical aneurism about 4 cm. in diameter. The mouth of the aneurism is large and the sac is completely filled with laminated coagulum, which does not, however, extend into the lumen of the vessel. The inner coat of the aorta is irregularly thickened from chronic inflammation.

1247. Part of an aorta including portions of its thoracic and abdominal divisions, together with the last three dorsal and upper three lumbar vertebræ. From the anterior aspect of the aorta between the pillars of the diaphragm an aneurism has formed and projects forwards as an ovoidal sac with a vertical measurement of 7 cm., and lined with a thin layer of coagulum. The lower limit of the dilatation is at the level of the origin of the renal arteries, and the superior mesenteric artery arises from the lower part of the sac.

A second dilatation involves the posterior wall of the aorta and communicates with the vessel by a mouth which corresponds in vertical extent with the upper half only of the anterior sac, and is bounded below by a concave rounded border. The posterior wall of this part of the aneurism is formed by the anterior surface of the last dorsal and first lumbar vertebræ. Both of the vertebræ are eroded, but the upper of the two much more deeply than the lower; the intervertebral disc between them, which is less affected than the bones, projects forwards as a distinct ridge. 6060

From a soldier, aged 35, who was admitted into U. C. H., under the care of Mr. Heath, July 3, 1884. He had complained of abdominal pain since an attack of dysentery in 1880. On admission there was a pulsating tumour in the epigastric region. On three occasions compression of the aorta below the aneurism with a Lister's tourniquet was practised under chloroform, but without obvious improvement. On July 23 the relation of the aneurism was ascertained by an exploratory incision, but nothing further was done. Death occurred on July 25. (Mr. Heath's *Case-books*, 1884, vol. i, p. 139.)

Syph. **1248.** Part of an abdominal aorta, with parts of its visceral branches. A glass rod has been passed from the aorta into a large aneurismal dilatation of the superior mesenteric artery. ~~The artery is dilated~~ immediately beyond its origin, ~~which is somewhat~~ diminished in size by endarteritis. The dilatation is about 6 cm. in diameter and of an elongated oval form, extending over about 8 cm. of the artery, which has apparently been increased in length as well as in circumference.

~~Externally~~ The sac is ~~bilobed, being~~ transversely ridged within in the situation of an outer sulcus. ~~The interior of the aorta,~~ which has been laid open from ~~behind, is wrinkled and raised in warty swellings from chronic endarteritis. The interior of the dilated mesenteric artery presents similar changes. The orifices of the cœliac axis and renal arteries are diminished in size.~~ [illegible] 2134

1249. Part of the superior mesenteric artery of a horse, dilated into an aneurism, in which lie numerous nematoid worms (*Strongylus gigas*). The external coat of

The aorta is [illegible] the bosses & wrinkling of syphilitic inflammation, and

and there are traces of fibrinous clot

[illegible] the inner coat

the artery is traceable over the whole of the dilatation, and is firm, white, and considerably increased in thickness. Beneath the thickened outer wall is a layer, in places about 3 mm. thick, and formed apparently by the hypertrophied muscular and inner coats. The dilatation is partially occupied by a loose reticular coagulum, from the interstices of which the delicate thread-like worms project. 1093

1250. A superior mesenteric artery in which a sacculated aneurism has formed upon the middle colic branch. The aneurism is rounded in outline, nearly 2·5 cm. in diameter, and is filled with dark laminated coagulum. 7757

From a girl, aged 17, who was admitted into U. C. H. in June 1896, suffering from aphasia and right hemiplegia. While in the hospital there was irregular fever. On Jan. 4, 1897, an epileptiform attack attended with loss of consciousness for 11 hours occurred. There were several attacks of hæmaturia, the last of 3 months' duration. On Feb. 11, 1897, patient had severe headache and became unconscious, and died 44 hours after the onset of the pain.

Aneurisms of the basilar artery and the renal artery from the same case are preserved in the Medical Series. There were soft vegetations on the mitral valve. (Dr. Bastian's *Case-books*, 1897, Females, vol. ii, p. 7.)

1251. Part of a splenic artery upon which a sacculated aneurism has formed. The aneurism is globular in shape, measuring 1·5 cm. in diameter, and communicates with the artery by an elliptical opening. The wall of the aneurism is extensively calcified. Two branches, both of which are patent, arise, one close to the neck of the sac and one from the aneurism itself. The splenic artery itself appears to be healthy. 6877

From an old woman.

Aneurisms of the Innominate Artery.

These may be fusiform or sacculated. They are almost always accompanied by dilatation or actual aneurism of the arch of the aorta. An innominate aneurism forms a pulsating tumour behind the right sterno-clavicular articulation and the upper part of the sternum, projecting usually into the hollow between the inner ends of the clavicles. It exerts pressure chiefly on the innominate veins and the trachea. When the tumour extends far upwards it may press upon the recurrent laryngeal nerve.

1252. The arch of an aorta, with parts of its main branches and of the trachea and œsophagus. The innominate artery has been dilated into a large aneurism, no indication of its original form remaining. From the upper and posterior part of the dilatation the right carotid and subclavian arteries arise, the root of the latter being dilated so as to add to the main sac. The aneurism is transversely oval, and measures about 8 cm. from before backwards, and is quite filled with tough-looking laminated coagulum. In some situations the wall of the aneurism is very thin. The trachea and the œsophagus have been displaced to the left side. The internal jugular vein appears to have been obliterated by the pressure of the aneurism. The aorta has been laid open and part of its concavity cut away; it appears to have been considerably dilated, and is extensively diseased. 3582

Death resulted from rupture of the sac into the trachea. The coagulum in the sac at the time of death was of a dark red colour.

1253. The arch of an aorta and its main branches, with the trachea and larynx, upper part of the sternum, and inner ends of the clavicles, dried. From the front of the innominate artery a large aneurism has been formed, the sac of which is irregularly globular, compressed from before backwards, and about 7 cm. in its greatest diameter. Viewed from the front the aneurism projects upwards 3·5 cm. above the sternum; transversely it extends from the sternal end of the left clavicle to 2 cm. beyond the right sterno-clavicular articulation. The trachea is displaced so much to one side that it lies opposite the inner end of the left clavicle. A small part of the aneurismal sac projects into the first intercostal space of the right side. The carotid and subclavian arteries lie for some distance in close contact with the back of the sac, and the right innominate vein is closely adherent to it. There are several small calcareous plates in the wall of the aorta. 2710

1254. The arch of an aorta and the large branches arising therefrom, together with the upper part of the anterior wall of the thorax and the inner ends of the clavicles and a large aneurism which has arisen from the innominate artery. The aneurism is nearly globular in outline and measures 12 cm. in diameter. It projects through the wall of the thorax to the extent of 8 cm. beyond the front of the sternum, reaching downwards to the lower border of the second rib of the right side and forming above a prominent swelling in the neck, the bulk of the tumour being to the right of the middle line. The inner end of the right clavicle is embedded in the sac, and the bone has been carried considerably forwards so as to be widely separated from the first rib. The mouth of the aneurism is situated in the anterior wall of the innominate artery and the adjacent part of the aorta; it is nearly circular in outline, and measures nearly 2 cm. in diameter. In its whole length the innominate artery is greatly dilated and flattened out on the posterior surface of the aneurism, and has a transverse measurement of 4 cm. In the recent state the cavity of the aneurism was occupied chiefly by fluid blood, but in its upper part there is laminated and decolorised coagulum which extends in a thin layer over other parts of the inner surface of the sac. The arch of the aorta is slightly dilated and presents extensive chronic endarteritis. Ligatures have been applied to both carotid arteries and to the right axillary in the first part of its course. The ligature on the right subclavian is clearly seen in the section of the vessel; it does not appear to have completely occluded the lumen. 8604

From a man, aged 56, a labourer, who was admitted into U. C. H. under the care of Dr. Roberts in May 1900. There had been cough and shortness of breath for 6 months and pain at the right side of the root of the neck for 2 months. On admission there was a pulsating tumour rising into the neck in the suprasternal notch and above the right clavicle, most prominent in the position of the right sterno-clavicular joint. The right carotid pulse was much smaller than the left; the right vocal cord was immobile and in an adducted position; there was a brassy cough. On July 10 Mr. Horsley tied the left common carotid artery with silkworm-gut. The aneurism steadily increased, and on July 24 the right carotid artery, which was very small, was ligatured under local anæsthesia produced by eucaine and cocaine. On Aug. 20 a ligature was applied to the first part of the right axillary artery. On Aug. 30 the patient was transferred to the St. Pancras Infirmary during the closing of U. C. H. On Sept. 26 he was readmitted, the aneurism having considerably increased in size. On Oct. 14 Mr. Johnson introduced five fine steel needles across the interior of the sac; the position of the needles was changed at intervals, and they were removed at the end of about 36 hours. The aneurism rapidly increased in size, the dyspnœa became more and more urgent and death occurred on Nov. 19. (Mr. Horsley's *Case-books*, 1900, p. 80.)

Aneurisms of the Carotid Arteries.

Aneurism of the common carotid artery is most frequently situated at the bifurcation. Aneurism of the external carotid artery is rare (1255), and of the internal carotid artery in the neck very rare. Carotid aneurism is relatively more common in women than other external aneurisms and occurs at an earlier age; it may result from embolism.

1255. The large vessels and nerves of the right side of the neck, together with the tongue, &c. A sacculated aneurism has arisen from the external carotid artery, the lower border of the mouth of the sac being situated about 1 cm. above the bifurcation of the common carotid. The sac measures nearly 3 cm. in its vertical diameter and is completely filled with firm laminated coagulum, which in the recent state was red in colour. The superior thyroid artery arises below the origin of the aneurism; the facial and lingual come off by a common trunk at its anterior part. The hypoglossal nerve is seen passing forwards from beneath the inner border of the aneurism, and its descending branch appears beneath the lower border of the aneurism.

The common carotid artery has been ligatured in its continuity rather above the middle of its length. A longitudinal section through the vessel shows the divided loop of the ligature, which completely occludes the artery. The coagulum above the ligature measures 15 mm. in length, and that below 5 mm.

From a woman, aged 23, who was admitted into U. C. H., under the care of Mr. Heath, Jan. 7, 1882. Since the age of 7 the patient had had several attacks of rheumatism, and during the last 12 months the joint swellings had been frequent and rheumatic pains almost constant. For some weeks there had been frequent vomiting and inability to swallow solid food. On Dec. 10, 1881, the speech was noticed to be indistinct, and deviation of the tongue to the right was noticed. On Dec. 14 a swelling as large as a filbert was discovered near the right angle of the jaw. On admission, the patient was thin, weak, and anæmic; the aneurism formed a swelling in the neck of the size and shape of half a small orange; it was very tense, and its pulsations were expansile. The right tonsil was pushed somewhat inwards, and slight pulsation could be felt beneath it. The tongue deviated to the right and the right half of the organ was wasted. There was a mitral systolic murmur audible at the apex of the heart and a double aortic murmur at the base. On Jan. 11 the common carotid artery was tied with silk. The wound healed completely by first intention. On the tenth day there was no pulsation in the aneurism, and from this time its size diminished. The vomiting persisted after the operation. On the 33rd day after the operation the patient complained of sudden pain at the back of the neck and down the spine; shortly afterwards the speech became unintelligible. On the following day the right arm and leg became paralysed, and death occurred on the 35th day.

There were vegetations on the mitral and aortic valves and one miliary abscess in the wall of the left ventricle. The spleen was large and contained many infarcts, some of which had softened. The kidneys were deeply scarred on the surface, probably from old infarcts. In the base of Broca's convolution was a vessel containing a small firm clot, probably an embolus, and there were five or six patches of yellow softening beneath the cortical grey matter. (Mr. Christopher Heath, Med. Chir. Trans., vol. lxvi, 1883, p. 69.)

1256. Part of the arch of the aorta, with the innominate and right carotid arteries, from a boy aged 9 years. Lying on the right carotid artery is a globular sac, somewhat exceeding 5 cm. in diameter, with a distinct wall of condensed areolar tissue and a smooth interior thinly coated with fibrin. The sac opens externally by a small depressed aperture in the integument, through which a piece of glass has been passed, and on the inner side it communicates with the common carotid artery. The aperture in the artery is accurately closed by the base of a firmly adherent laminated clot, which, without any diminution in the calibre of the vessel, projects outwardly into the sac; the margins of the opening are rounded and shelving, and the clot is firmly adherent to them.

The common carotid artery has been tied immediately above its origin. The ligature has completely divided the vessel, with the exception of a small part of the outer side, to which it is still adherent. The distal end of the vessel is firmly closed, the proximal is widely open. 3594

The most probable explanation of this specimen is that the sac was originally a lymphatic gland lying in close contact with the carotid artery, that suppuration occurred in the gland, and that finally the carotid artery was opened by ulceration extending from the cavity of the abscess.

G. A., a boy, aged 9 years, was admitted into U. C. H. October 20, 1841, with a tumour on the right side of the neck extending from the angle of the jaw to within an inch of the clavicle, and from the posterior border of the sterno-mastoid muscle as far forwards as about half the length of the body of the lower jaw. The tumour also projected into the fauces between the arches of the palate and impeded respiration and deglutition. It pulsated immediately over the carotid artery, but not when pressed laterally or felt inside the mouth. It was said to have been first noticed two months before when it was very small, and immediately below the right ear. Its growth was slow and gradual until within three or four days of the patient's admission, when the tumour increased more rapidly and became irregular in shape. Mr. Liston punctured the tumour under the impression that it contained pus, but rapid arterial hæmorrhage immediately occurred, and the opening was closed with hare-lip pins and sutures.

October 21st.—Mr. Liston tied the carotid with considerable difficulty, owing to the small space left between the lower margin of the tumour and the clavicle. No unfavourable symptoms occurred during the first twelve days, and the tumour diminished much in size and hardness. On November 3rd bleeding took place from the wound in the lower part of the neck. This occurred several times during the two following days, and the boy died November 5th.

The tumour extended upwards to the base of the skull and downwards to about 1 inch below the bifurcation of the carotid artery. In the recent state three enlarged lymphatic glands (each about the size of a small walnut) were closely connected by fibrinous exudation to the outer and lower part of the cyst, and reached down along the anterior margin of the sterno-mastoid to within a quarter of an inch of the upper end of the incision made for securing the carotid. About three quarters of an inch of the termination of the common carotid, and about an inch of the first part of both the external and internal carotid arteries, were firmly connected with the swelling. The cyst contained a large quantity of dark coagulated blood, and its walls were lined with a thin layer of lymph, having an uneven surface at parts somewhat like the appearance of the interior of the auricle of the heart. Besides this the wall of the tumour presented an outer layer of condensed cellular tissue which closely adhered to surrounding structures, and a middle layer, dense and opaque, which appeared like a white line in the section. In the recent state the opening from the artery into the cyst was closed by a firm coagulum. The fatal hæmorrhage occurred from the proximal side of the ligature.

1257. A larynx and trachea, together with part of the heart, aortic arch with a large aneurism arising therefrom and parts of the large vessels of the neck. The aortic aneurism forms a large rounded tumour springing from the aorta on the proximal side of the origin of the innominate artery, and is almost completely occupied by laminated clot. The innominate veins are stretched over the surface of the aneurism. A second small aneurism arising from the posterior and inner aspect of the innominate artery lies in front of the trachea. At its upper part the carotid artery is converted into a dense fusiform mass of fibrous tissue, from which several of the branches of the external carotid artery pass off. In the divided upper extremity of the posterior part of this fusiform mass the section of the internal carotid artery can apparently be recognised, its lumen almost obliterated. To the outer surface of the enlargement the thickened and nearly obliterated internal jugular vein is adherent; the vein passes downwards to the upper surface of the aortic aneurism, from which point the right innominate vein can be traced as above described. In the whole of its extent the common carotid artery is thickened and its lumen obliterated.

Within the trachea a small projection corresponds with the innominate aneurism above described, and two similar projections, evidently of coagulum beneath the mucous membrane, project from the aortic aneurism into the right bronchus.
5565

From a case in which the common carotid artery was ligatured for the cure of an aneurism of the external carotid artery.

Aneurisms of the Subclavian Artery.

These are most common in the third part of the artery and on the right side. They are usually sacculated, but may be fusiform. A subclavian aneurism forms a pulsating tumour, filling the hollow above the clavicle (1258). The most important structure pressed upon by it is the brachial plexus.

1258. A wax model of the right side of the neck and adjoining part of the thorax, from a patient who was operated on by Mr. Liston for aneurism of the third part of the subclavian artery. The aneurism forms a well-defined hemispherical swelling about 5 cm. in diameter, immediately above the middle of the clavicle, in the space between the clavicular attachments of the sterno-mastoid and trapezius muscles. The skin over the aneurism is represented as unaltered. 2523

1259. A wax model of the neck and adjoining part of the thorax, from a man who was the subject of an aneurism of the third part of the left subclavian artery. The aneurism forms a well-defined hemispherical swelling, about 7 cm. in diameter, immediately above the clavicle and filling the interval between the sterno-mastoid and trapezius muscles. 4949

1260. Part of the arch of an aorta, with the great trunks arising from it, and the right subclavian and carotid arteries. From the upper wall of the third part of the right subclavian artery a small aneurism has been formed, the sac of which is about 3 cm. in diameter, and overlaps the adjoining part of the artery. A ligature was applied to the first part of the artery for the cure of the aneurism. The ligature has come away, the artery being severed about 2 cm. beyond its origin, and to the inner side of its branches. The proximal end of the vessel is closed by a firm conical coagulum, which does not, however, extend to the bifurcation of the innominate trunk. There is no clot in the distal end of the vessel, which is widely open. The wall of the portion ligatured appears to be healthy. 2584

W. Betts, aged 32, admitted into U. C. H. Sept. 1839. Seven weeks after the swelling was first noticed it had attained the size of a hen's egg. The first part of the subclavian artery was ligatured by Mr. Liston, great difficulty arising from its unusual depth in the neck. The vessel, as seen in the specimen, lies much behind the carotid at its origin. The patient died thirty-six days afterwards from hæmorrhage. A clot had formed in the cardiac end of the subclavian artery, the hæmorrhage having taken place from the distal side.

1261. The transverse part of the arch of an aorta, with the trunks arising from it, and the right common carotid and subclavian arteries. A small sacculated aneurism has arisen from the upper aspect of the third part of the subclavian, with which it appears to have a wide communication. For the cure of the aneurism the subclavian artery was ligatured immediately beyond the bifurcation of the innominate; and in order that the blood-stream through the carotid might not prevent the formation of a coagulum on the proximal side of the ligature, the carotid artery was also tied close to its origin. The ligature on the carotid has separated, the artery on either side being firmly closed. The subclavian artery on the proximal side of the ligature (which is not quite separated) is also firmly closed; the distal end has been laid open; there is no clot in the neighbourhood of the ligature, and it was from this end of the subclavian artery that fatal hæmorrhage ensued; the rest of the artery is pervious, even at the mouth of the sac. The sac of the aneurism is filled with coagulum. The aorta shows marked signs of endarteritis; the subclavian artery is apparently healthy. 2673

The patient, aged 31, was operated on by Mr. Liston, July 12th, 1838. Death followed from hæmorrhage on the thirteenth day after the operation.

Aneurisms of the Axillary Artery.

These occur almost exclusively in the upper part of the artery opposite the shoulder-joint. They are usually sacculated, but fusiform aneurisms have been met with in this situation. The aneurism may press upon the brachial plexus and the axillary vein. When of great size it may lead to destruction of the upper ribs (1262), and may even rupture into the pleura.

1262. Part of an axillary artery, with the sac of an aneurism which has formed from its inner side, together with parts of the brachial plexus and of the second rib. The aneurism (the front of which has been cut away) is irregularly globular, and in places very thin-walled. The sac is lined with a layer of laminated fibrin, which in the lower and inner part forms a mass 3 cm. in thickness. The mouth of the aneurism is situated immediately above the origin of a large branch, probably the subscapular; on each side of the mouth the axillary artery is slightly dilated. Anteriorly the outer surface of the rib lies exposed in the sac, and is superficially ulcerated. The tissues surrounding the artery in the neighbourhood of the sac are consolidated and firmly united with it. 3634

From a man, 60 years of age. No operation was performed in consequence of symptoms indicating disease of the heart and arteries. Death was caused by rupture of the sac, which gave way at its lower part; there was much blood effused between the muscles of the thorax.

Aneurisms of the Arteries of the Arm, Forearm, and Hand.

Spontaneous aneurisms of these vessels are very rare. They appear usually to have resulted from embolism.

Aneurisms of the Iliac Arteries.

These most commonly spring from the external iliac artery close to Poupart's ligament (1263). They usually encroach upon the upper part of the thigh. They are almost invariably sacculated, although fusiform aneurisms have been seen in this situation. The vein accompanying the artery, and some of the branches of the lumbar plexus, may be compressed by it.

1263. The lower part of an abdominal aorta, with the iliac, and part of the right femoral, arteries and the corresponding veins. Lying upon the front of the femoral artery is a globular aneurismal sac, about 7 cm. in diameter, which has been laid open along its anterior aspect. The deep epigastric and the profunda arteries arise apparently from the sac. The mouth of the sac is about 4 cm. in length, but is in part concealed by an adherent mass of clot; and the interior of the sac is coarsely corrugated and in places covered with a layer of fibrin. The femoral vein is adherent to the aneurism opposite its mouth; it is much diminished in calibre, and contains adherent clot for some distance on either side. The external iliac artery has been ligatured 3 cm. from its origin, and 4·5 cm. from the aneurism. The noose of the ligature is buried beneath a layer of inflammatory exudation. The inner coat of the aorta and common iliac arteries is thickened, wrinkled, and irregularly calcified. 3617

From a man, aged 40, who was admitted into U. C. H. March 25, 1843, with a pulsating painless tumour in the right groin, measuring 6½ inches across and 4 inches in the longitudinal direction. There was slight œdema of the limb. The patient had been a coach-maker, and was of intemperate habits. He had occasion, at times, to lift heavy weights, and about twelve months before admission he first noticed a swelling in the right groin about as large as a nutmeg. The swelling remained stationary for four or five months, but after this commenced to enlarge, the enlargement having proceeded more rapidly during the month before admission. Mr. Liston tied the external iliac artery. The patient progressed well until the third day, when the temperature of the foot began to fall, and on the fourth day the man died of gangrene of the limb.

1264. The bifurcation of an aorta, with the common iliac, external iliac, and part of the femoral, arteries of the left side. Involving the lower part of the external iliac artery and the common femoral artery is a dense fibrous mass resulting from the healing of an aneurism of the vessel. The fibrous mass measures 5 cm. in length and 2 cm. in width, and in section presents a dense fibrous structure, in which the outline of the original aneurismal sac can be distinctly traced as a wavy line continuous with the wall of the artery. Above the healed aneurism the external iliac artery is shrunken and obliterated by a slender dense clot, the upper end of the vessel being occupied by a more recent laminated clot. The superficial femoral artery beyond the healed aneurism is patent, and contains a delicate coagulum which is prolonged into a small collateral branch. The profunda artery, a small part of which is seen below the aneurism, is thickened and partly obliterated. The femoral vein, where adherent to the back of the aneurism, contains a coagulum. There is slight irregular thickening of the inner coat of the aorta and common iliac artery. 7457

From a man, aged 48, who was admitted into U. C. H., in 1887, under the care of Mr. Barker, on account of a large pulsating tumour in the left groin, extending from 2½ inches above Poupart's ligament to 2½ inches below it. The pulsation could be arrested by compression of the iliac artery above the aneurism. As the result of low diet and the administration of iodide of potassium, the pulsation in the aneurism diminished, but the tumour did not get harder. On the 6th day digital compression was continued for 9 hours, and again on the 8th for 7½ hours, and on the 9th for 8 hours, without marked benefit. On the 12th a Carte's abdominal compressor was applied for 3 hours. On the 14th no pulsation could be felt in the femoral artery beyond the apex of Scarpa's triangle, and the leg was rather dusky. On this day the patient was anæsthetised for ligature of the external iliac artery; the patient struggled during the administration. The skin incision had just been made when all pulsation in the aneurism ceased, and the operation was not proceeded with. On the 14th day after the cessation of the pulsation the patient was allowed to leave his bed, and when discharged from the hospital on the 28th day the solidified aneurism was of considerable size but was quite hard. Death occurred on Nov. 16, 1895, from an aneurism of the aortic arch. (Surg. Reg. Rep., 1887, p. 27, and Trans. Path. Soc., vol. xlvii, 1896, p. 32.)

Aneurisms of the Femoral Artery.

Spontaneous aneurisms of the femoral artery are comparatively uncommon, except at the commencement of the common femoral, when it is difficult to say whether they involve this vessel or the external iliac. Occasionally an aneurism springs from the femoral in Hunter's canal. It exerts pressure on no important structure.

1265. Part of a femoral artery and vein, together with an aneurism which was cured by compression of the femoral artery above the sac. The sac is of a long fusiform shape, about 8 cm. and 4 cm. in its diameters, and is completely filled with coagulum, in which traces of lamination are discernible. The walls of the sac are thickened, very firm, and adherent to the surrounding parts. The femoral artery below the aneurism is obliterated for nearly 3 cm., being diminished in size and containing a fibrous-looking clot; the tissues lying around it are consolidated and adherent, and have been cut away so as externally to give an appearance as though the vessel remained of equal size throughout. Above the aneurism the artery is obliterated as high as it is preserved in the specimen. The vein is unaltered, but is bound closely to the obliterated sac by the indurated tissues around. 3617

John Wilcox, admitted under the care of Mr. Liston, July 13th, 1843. He stated that three weeks previously he first felt pain on the inner side of the thigh at the junction of the middle and lower thirds, which was increased by movement. In a few days a small tumour appeared, which continued to increase till admission. The case was treated at first as an abscess. The swelling was near the opening in the adductor magnus. All the usual symptoms of aneurism were present on the patient's admission to the Hospital. On July 16th a Signorini's tourniquet was applied to the femoral artery in the middle third of the thigh, so as to compress the vessel against the femur. The compression was continued until September 10th, at which time the pulsation was very slight. At this date there was great pain in the leg and knee, and afterwards the pulsation entirely ceased. After the use of compression for a short time longer the patient was discharged cured. Death occurred suddenly three years afterwards, but no *post mortem* examination was obtainable. (See 'Lancet,' 1843–44, p. 105.)

1266. Part of the sac of a femoral aneurism which was cured by pressure. The aneurism is situated nearly in the same position as in the last specimen, viz. at the point where the vessel perforates the adductor magnus; it contains a cavity 2·5 cm. in diameter, which was filled, in the recent state, with firm brownish clot. The wall of the sac is composed of dense fibroid tissue, and is about 5 mm. in thickness. The femoral artery is obliterated opposite the aneurism; below it is pervious, though somewhat contracted in size; the vein is occluded at the upper part of the specimen, and both the artery and the vein are enveloped in dense fibrous tissue. 3640

William Dipple, aged 53, was admitted into U. C. H. under Mr. Liston, January 20, 1844, with aneurism of the femoral artery. He stated that the swelling began about two months previously in consequence of a strain of the leg. The swelling continued to increase and now reached from the middle of the thigh nearly to the inner condyle. Pressure was made with the ring tourniquet at the junction of the upper and middle thirds of the thigh, and was continued until March 4th, when pulsation ceased, and the aneurism became quite hard. On May 3rd the patient was discharged well. Subsequently he went to Scotland, and amputation of the thigh was performed for disease of the knee. The limb was removed eighteen months after the cure of the aneurism; the knife passed through the remains of the sac.

This and the preceding case were the first cured in England by means of compression.

1267. The sac of a large aneurism connected with the profunda branch of the femoral artery, together with part of the great sciatic nerve. The sac is almost quadrilateral in outline, and flattened from before backwards, and measures about 6 cm. antero-posteriorly, and 13 cm. from above downwards. The profunda artery has been dissected from its origin. The large vessels ramifying on the surface of the sac are probably the upper perforating and muscular arteries; below these the continuation of the profunda has been laid open; its coats appear quite healthy, and it terminates in an oval opening which communicates with the sac. The opening measures nearly 2 cm. in its longest diameter, and the artery at this point is dilated. On the back of the specimen the sciatic nerve is shown lying on the adductor magnus. 4772

The specimen was taken from a patient who died from pneumonia under Dr. Garrod's care very shortly after admission to the Hospital. The swelling in the thigh had not been carefully examined during life. It is probable that a small aneurism resulted from inflammatory softening of the wall of the profunda artery, due to the lodging of an embolus at the origin of one of the perforating branches, and the rupture of this was followed by an effusion of blood, which was subsequently limited by the inflammatory consolidation of surrounding parts.

Aneurisms of the Popliteal Artery.

These are the most common of all external aneurisms. They are almost invariably sacculated, and may arise from any part of the vessel, and from any aspect of it. When arising from the anterior part, the trunk is stretched over the sac. They exert serious pressure on the popliteal vein and nerves, and if allowed to attain a sufficient size may lead to destruction of the knee-joint. If left unrelieved, popliteal aneurisms end by rupturing beneath the fascia. The enormous extravasation of blood soon arrests the circulation in the limb, and gangrene follows.

1268. A popliteal artery, with parts of its anterior and posterior tibial divisions and the corresponding veins. From the popliteal artery, near its commencement, an oval aneurism has formed, which measures 7 cm. and 5 cm. in its chief diameters; its interior is thinly coated with fibrin. The aneurism has apparently commenced as a fusiform dilatation of the artery, one side of which has subsequently yielded more than the other. The popliteal vein is diminished in size, and its cavity closed by a coagulum. 1779

1269. The femoral and popliteal arteries, with the corresponding veins and portions of the popliteal nerves, and the sac of a popliteal aneurism completely filled with coagulum. The sac of the aneurism is globular in shape, about 5 cm. in diameter, and has been formed from the anterior wall of the popliteal artery, the artery above being dilated for a distance of about 5 cm. Both the sac and the dilatation are completely filled by a coagulum, which is prolonged for a short distance into the artery on either side. About 1 cm. below the origin of the profunda the femoral artery divides into two branches of equal size, which after running together for about 16 cm. reunite to form a single trunk. A silk ligature has been applied to one of these divisions about 3 cm. from its lower termination in the common trunk above noticed. The artery above the ligature contains a cylindrical coagulum which reaches to within a short distance of its origin; and below the ligature it is occluded by a coagulum which reaches as far as the reunion of the two divisions of the vessel. The peripheral part of the coagulum is firm, dense, and faintly laminar; the central portion is loose in texture, and has a finely granular surface, in places mottled with grey and brown.

The walls of the sac, as well as those of the dilated portion of the vessel above it, are thickened, dense, and fibrous.

The tumour had been noticed for about four years, and was situated in the lower part of the ham. About a month before the patient applied to the hospital the swelling became suddenly larger, and great numbness was felt in the leg and foot. On compression of the artery in the groin the pulsation in the aneurism could be stopped, but this did not occur when pressure was made in the middle of the thigh. *

The artery shown in the specimen was easily ligatured after lifting up the edge of the sartorius muscle. After the application of the ligature the aneurism ceased to pulsate; but pulsation returned in a few moments, and half an hour afterwards was as distinct as before the operation. The wound was brought together with straps of adhesive plaster. On the third morning after the operation the patient was feverish, complained of pains through the body, and had a slight cough; the wound was not healing favourably. On the day following the cough was worse, and the patient was bled to 6 ounces.

Two days afterwards death ensued. At the *post mortem* examination the sartorius muscle was found inflamed, being swollen and tumid with serous effusion.

Sir Charles Bell, in whose practice the case occurred, attributed the coagulation of the blood in the aneurism in part to weakness of the circulation, arising from the fever. ('Medical and Physical Journal,' February 1826.)

1270. Parts of the popliteal artery and nerves, with a portion of the sac of a large thin-walled aneurism which has arisen from the posterior wall of the popliteal artery. The artery opens into the sac by an aperture 2 cm. in length, which has involved about two thirds of its circumference. The popliteal nerves lying on the aneurism are adherent to it. The lining of the sac is deeply creased, thickened, and in places roughened by a thin layer of fibrin. 3603

The femoral artery was ligatured; but gangrene of the limb followed in a week, and amputation of the thigh was performed.

1271. The lower part of an abdominal aorta, with the iliac arteries and the femoral and popliteal of the right side. All the vessels are the seat of extensive endarteritis. In connection with the popliteal artery an oval aneurism, about 7 cm. in length, has formed, for the cure of which the external iliac artery was tied. The sac of the aneurism is filled with laminated coagulum. The ligature has been applied about 4 cm. above the origin of the profunda. Close above the knot of the ligature is an ulcerated aperture in the wall of the artery; there is no clot in the vessel, either above or below the ligature. 5380

The patient was a man between 50 and 60 years of age, who had been a free liver and a pedestrian. In 1870 he lost his left leg from senile gangrene, spontaneous amputation being completed by dividing the bones with a saw, and slightly improving the form of the stump. Early in 1871 an aneurism formed in the right ham. The patient was seen by Sir J. Erichsen at the end of March. Compression was tried for some time, but without success. After a consultation with Sir William Fergusson it was agreed to tie the femoral artery; but on exposing it the artery was found too unsound for ligature. Ten days afterwards the external iliac was tied by Sir J. Erichsen. A thick ligature was used for fear of cutting through the diseased vessel, and for the same reason the ligature was only drawn sufficiently tight to stop the pulsation in the aneurism. Death ensued on the fourteenth day, from secondary hæmorrhage.

1272. A femoral, with part of the popliteal artery and an aneurism of the latter, which was cured by ligature of the femoral artery, about 3 cm. below the origin of its profunda branch. The aneurism is a solid spherical mass, the walls of which are composed of dense fibrous tissue; the contained coagulum presents no marked lamination; in some parts it is homogeneous and firm, in others looser in texture and of a whiter colour. The canal of the artery, at the mouth of the sac, is exceedingly small or completely occluded. The popliteal vein appears healthy. The femoral artery is obliterated at the seat of ligature, and united to the indurated tissues around; the interior of the femoral vein in this situation is healthy and its canal free. A small clot has been formed in the artery above the ligature; the vessel below the ligature is pervious and has been filled with a roll of paper. 626

The femoral artery was tied for the cure of the aneurism by Mr. J. M. Arnott. The ligature came away on the 31st day; the patient died 3 months afterwards from the bursting of a small aneurism of the aorta into the pericardium.

1273. A popliteal aneurism, with the main arteries of the lower limb and corresponding veins. The femoral artery and vein are united at the seat of ligature and adherent to the sartorius muscle, the ends of the artery being widely separated, but held together by dense cicatricial tissue. Below the seat of ligature the femoral artery is much contracted, its inner coat being thrown into deep transverse wrinkles. The sac of the aneurism is completely filled with firm coagulum; its exterior is smooth, well defined, and but loosely connected with the soft parts around. The femoral vein is filled with coagulated blood, which is completely decolorised and adherent opposite the portion of the artery tied. 5350

The patient, aged 23, was admitted into U. C. H. October 1869. He had complained of pain in the calf of the leg for five weeks. On examination a tumour, presenting the ordinary signs of popliteal aneurism, was found.

Compression was tried from October 4th until November 10th, irregularly, for a few hours each day by means of Carte's tourniquet and flexion of the knee. On November 10th, the aneurism being larger, the femoral artery was tied. As the needle was being passed beneath the artery there was a sudden gush of venous blood, which was arrested by pressure. Erysipelas ensued in the following week, from which the patient recovered, but was attacked afterwards with fatal pneumonia, death taking place on December 25th.

1274. Part of a popliteal artery, with the remains of a small aneurism which was cured by compression a year before death. The aneurism is spherical and not more than 13 mm. in diameter; it has been laid open, and the coagulum which it contained removed, except a peripheral portion which is intimately adherent to its interior. 5345

The patient died a year after the operation, from rupture of the pulmonary artery into the trachea.

1275. A plaster cast of a left leg and foot, with the lower part of the femur, removed by amputation for gangrene of the foot, which ensued from the obliteration of the popliteal artery attending the spontaneous cure of an aneurism. The consolidated aneurism compressed the popliteal vein. The sac of the aneurism (which has been exposed by a median incision) forms a solid oval mass about 6 cm. in its long diameter.

The patient, a middle-aged man, was admitted into U. C. H. for spontaneous gangrene of the foot. Careful examination of the popliteal space led to the discovery of a solid tumour, which was recognised as a consolidated aneurism. The limb was amputated by Sir J. Erichsen, and the patient recovered.

1276. The lower part of a left femur and the upper part of the leg-bones, together with the corresponding portions of the muscles of the leg and the vessels and nerves in the popliteal space. Springing from the anterior aspect of the popliteal artery, and occupying the whole of the popliteal space, is a large sacculated aneurism. The posterior aspect of the aneurism is lobulated, a large external protrusion being separated from two smaller internal protrusions by a shallow sulcus, in which lie the popliteal artery, the popliteal vein, and the internal popliteal nerve. The vein and the nerve are considerably flattened by the pressure of the aneurism. The external popliteal nerve, which is also flattened, passes obliquely across the external, most prominent part of the aneurism. The wall of the aneurism appears at all parts to be very thin; on the inner side it is intimately connected with the inner head of the gastrocnemius. 6846

From a man, aged 62, admitted into U. C. H. under the care of Mr. Beck, on May 13, 1892, on account of a swelling behind the left knee of 18 months' duration. On admission there was a large aneurism of the left popliteal artery, the skin over the most prominent part of which was red, œdematous, and hot. The circulation in the foot was active. Three quarters of an hour after admission the femoral artery was tied at a point 5 inches below Poupart's ligament, two catgut ligatures being applied, and the vessel divided between them. Pulsation in the aneurism was completely arrested. On May 14 the foot was mottled, and the circulation in it very feeble. On May 15 the skin of the leg was blue on the outer side, as high as the head of the fibula. Amputation was performed through the junction of the middle and lower thirds of the thigh. The patient left the Hospital on June 29. (Mr. Beck's *Case-books*, 1892, vol. i, p. 12.)

1277. A popliteal artery, together with a sacculated aneurism connected with its upper part. The aneurism is irregularly oval, and measures 4·5 cm. in length; it arises from the anterior aspect of the artery. The section shows that the cavity of the aneurism is completely filled with dark non-laminated clot, which also occupies the corresponding part of the artery. The mouth of the sac is nearly 2·5 cm. in length, and at the upper and lower borders of the opening the wall of the artery can be seen passing continuously into that of the aneurism. Opposite the middle of the mouth of the sac the posterior wall of the artery is distinctly bulged. Above the mouth of the aneurism the lumen of the artery is blocked for a distance of 1·5 cm.; but inferiorly the clot extends in the vessel as far as the lowest part of the portion preserved. 7220

From a man, aged 43, who was admitted into U. C. H., under the care of Mr. Heath, on March 15, 1894, complaining of pain and swelling behind the right knee, of a week's duration. The swelling proved to be an aneurism of the popliteal artery as large as a tangerine orange. On March 16 Mr. Heath tied the superficial femoral artery in Scarpa's triangle with silk. Pulsation of the aneurism completely ceased on tightening the ligature and did not return. After the operation the circulation in the foot was very feeble, and gangrene gradually supervened on the outer side of the heel, and in patches on the outer side of the leg as high as the junction of the upper and middle thirds. On April 13 Mr. Horsley performed amputation through the lower third of the thigh, the femur being divided four inches above its lower extremity. The wound healed almost throughout by first intention; the patient left the hospital on May 15. (Mr. Heath's *Case-books*, 1894, vol. i, p. 43.)

1278. A small popliteal aneurism removed by operation, and divided longitudinally. The sac is ovoid in shape, and measures 4·5 cm. in length; its wall is 4 mm. in thickness, and its interior is for the most part occupied by slightly laminated clot. The artery has been divided close to the sac, both above and below, and a piece of glass rod shows the position of the lumen of the vessel. 7225

From a man, aged 33, who was admitted into U. C. H., under the care of Mr. Heath, on Feb. 9, 1894, complaining of a pulsating tumour in the right popliteal space, of about six weeks' duration. The tumour had all the characters of a small popliteal aneurism. After an unsuccessful attempt to cure the aneurism by digital compression of the femoral artery, Mr. Heath tied the vessel in Scarpa's triangle, with silk, on Feb. 21. On tightening the ligature the pulsation in the aneurism completely ceased. On Feb. 26, slight pulsation in the aneurism could again be felt. On March 23 digital compression was applied to the common femoral artery for 6 hours; on March 29 the aneurism itself was compressed for an hour with a Signorini's tourniquet; on March 31 an Esmarch's bandage was applied to the limb for an hour. The pulsation still continued, and on April 4 Mr. Horsley excised the aneurism. The popliteal vein and the internal popliteal nerve were separated from the wall of the aneurism; the latter was laid open, and, after ligature of the artery above and below it, was excised. The wound healed by first intention, and the patient left the hospital on April 27. (Mr. Heath's *Case-books*, 1894, vol. i, p. 27.)

Aneurisms of the Arteries of the Leg and Foot.

Spontaneous aneurisms of these vessels are very rare: they probably are most commonly the result of embolism.

1279. Part of a femoral artery, together with the popliteal, and parts of the anterior and posterior tibial, arteries. The anterior tibial artery is the seat of a fusiform aneurism which involves the vessel for a distance of 8 cm. from its origin. The wall of the aneurism is thin and the interior is filled with blood-clot, the peripheral parts of which are paler and firmer than the central part, but not laminated. Beyond the lower extremity of the sac the anterior tibial artery is obliterated. The posterior tibial artery is plugged with firm adherent clot as low as the origin of the peroneal artery. The position in which the femoral artery had been ligatured in Hunter's canal is readily recognisable, but the ligature is for the most part buried in new tissue. The vessel is completely occluded by the ligature, but none of the coats appear to have been divided. The artery above the ligature contains a slender coagulum 4 cm. in length. Below the ligature the artery is empty for a distance of 4 cm., and from this point as far as its bifurcation the vessel contains an almost continuous but very slender coagulum. The arteries are not diseased. 6821

From a man, aged 31, who had suffered from chorea 20 years previously and rheumatic fever twice. Six months before admission, after an attack of influenza, he experienced pain in walking, followed by swelling behind the right knee. On admission the patient was pale and wasted, the right foot and leg were very œdematous; there was forcible expansile pulsation accompanied by a throb along the upper part of the anterior tibial artery. The heart's apex-beat was in the 5th space, more than an inch outside the nipple line; a systolic murmur was present at the apex and a double murmur at the base. The temperature on admission was 101°·6. On the 8th day the femoral artery was ligatured with silk in Hunter's canal. The temperature remained irregular, and at the time of discharge on the 30th day the aneurism was moderately firm but hardly reduced in size. About 3 weeks later the patient was readmitted into a Medical Ward, and died suddenly on the 4th day from cardiac failure. The aortic valves showed advanced disease. (Surg. Reg. Rep. 1891, p. 54, No. 1803.)

TRAUMATIC ANEURISM.

An aneurism may result from injury of a healthy artery, if the vessel is ruptured subcutaneously or wounded in such a way that external hæmorrhage is impossible. The blood then accumulates in the tissues around the wound in the vessel and, becoming gradually surrounded by a sac-wall, forms a circumscribed blood-tumour communicating with the artery. A traumatic aneurism may also result from the yielding of a cicatrix in the arterial wall.

When a wound of an artery and vein is followed by the development of an aneurism communicating with both vessels, the aneurism is spoken of as *arterio-venous* or *varicose*.

1280. A left clavicle and part of the scapula, with the subclavian, and part of the axillary, artery, and an aneurism which has followed an injury of the former vessel. The clavicle has been repaired after a fracture outside the middle of its length, with overlapping of the outer by the inner fragment. Filling the space between the clavicle and the upper border of the scapula is an aneurismal sac, the walls of which are so thin as to be scarcely distinguishable from the clot which lines them. The greater part of the sac is filled with laminated coagulum; the more central coagulum is not laminated and was of more recent formation. The subclavian artery, which is of normal size, contains a small loose thread-like clot, formed probably after death. The communication between the aneurism and the subclavian artery is very small, and has been torn across in removing the parts; a glass rod has been passed from the vessel into the sac of the aneurism.

The patient was a man, 48 years of age, subject to fits and paralysed on the left side. He was knocked down in the street on September 12th, 1878, and sustained a comminuted simple fracture of the left clavicle, and had several ribs broken, including, as was afterwards found, the first. The patient was admitted into U. C. H. for treatment, and was made an out-patient September 29, 1878. He was re-admitted on October 31st on account of a pulsating swelling occupying the posterior triangle on the left side, which proved to be an aneurism of the third part of the subclavian artery.

It being impossible to compress the artery between the heart and the aneurism, which rapidly increased in size, Mr. Heath amputated the paralysed arm at the shoulder-joint on November 4th, with antiseptic precautions, tying the axillary artery with a catgut ligature. There was secondary hæmorrhage to the extent of 4 ounces ten days afterwards. The patient made a good recovery, but the effect on the aneurism, was hardly, if at all, appreciable. The aneurism continued to increase in size, and a leaden shield was moulded to it for support. On two occasions a grain of ergotine was injected into the subcutaneous tissues without benefit. On Jan. 1, 1879, Mr. Heath introduced into the sac three pairs of fine sewing-needles, making each pair cross within the sac. Considerable clotting of blood occurred around the needles, which were withdrawn on the 5th day. The aneurism gradually became solid, but bronchitis supervened and the patient died on Jan. 18, 1879.

The fractured first rib from this case is preserved in No. 167.

1281. Portion of a brachial artery from the bend of the elbow, with the median basilic vein lying over it, the vein having been opened in venesection. In opening the vein the anterior wall of the brachial artery has been wounded, the injury having led to the formation of a small spherical aneurism between the artery and the median basilic vein. No communication exists between the sac and either of the vessels, but in the situation of its original communication with the artery is a small pit, the bottom of which is formed by a white tough-looking cicatricial tissue. The vein for about 2·5 cm. opposite the puncture is extremely contracted; immediately over the aneurism it appears to have been obliterated after complete division. 1460

The aneurism has doubtless arisen from the stretching of the new tissue formed in the repair of the wounded vessels, its communication with which has subsequently become closed.

The sac was probably filled with fibrin.

1282. Parts of the brachial, radial, and ulnar arteries of the right side, together with the median basilic and basilic veins. At a point which was situated about 12·5 cm. above the bend of the elbow the brachial artery divides into two trunks of unequal size, which run downwards side by side for a distance of 15 cm. and become united laterally for a length of 6 mm., beyond which they are continued into the two vessels of the forearm. Between the median basilic vein and the lower part of the larger of the two divisions of the brachial artery an arterio-venous aneurism has been formed. The aneurism is tubular in shape, and measures 2·5 cm. in length and 1·5 cm. in diameter; it is thick-walled, and communicates freely with the two vessels. Opposite the situation of the aneurism the vein is greatly dilated, and its wall thickened for a distance of about 8 cm. Ligatures have been applied to both divisions of the brachial artery; from the larger division the ligature has separated, and the vessel is completely divided at a point 4 cm. above the aneurism; on the smaller division, the ligature, which is still *in situ* and includes a tributary of the basilic vein, is situated 6 cm. above the aneurism. 628

There are several paintings of the limb by Sir Charles Bell in the College Collection, and a cast of the limb in the Museum of the Royal College of Surgeons. (See Lawrence, Journ. Anat. & Phys. 1901, vol. xxxv.)

INJURIES AND DISEASES OF VEINS.

Wounds of Veins.

A punctured wound of a vein, such as is made in venesection, unites by first intention without occlusion of the vessel.

When a vein is ligatured in its continuity the distal part, as far as the next valve, is distended with coagulum; the proximal part is either empty to the next valve or contains a small imperfect clot (1284). The changes by which the vessel is permanently obliterated are similar to those which occur in wounded arteries.

A vein in an amputation wound is usually found collapsed and empty as far as the next valve on the proximal side.

1283. Portion of an internal saphenous vein, showing an oval ulcerated aperture in its wall, which was made with caustic potash with a view of producing obliteration of its cavity. The vessel, both above and below, is shrunken and contracted; it contains a few adherent shreds of fibrin, apparently the remains of a disintegrated clot. The wall of the vein is thickened in its whole length from inflammation. 3600

From a man, aged 48. Death ensued ten days after the application of the caustic, from phlebitis (pyæmia?).

1284. The axillary vessels and brachial plexus of a patient who died from gangrene of the arm. The axillary vein was divided in the situation marked by the piece of whalebone, during the removal of a tumour from the axilla, and has been ligatured on either side of the wound. The distal portion of the vein is tensely distended with a firm tapering coagulum, which ceases at the succeeding valve: the proximal coagulum is much smaller. The coats of the vein are thickened and swollen in the immediate neighbourhood of the injury. 3743

1285. Portion of a subclavian vein and artery, the former being completely occluded near its lower end by a surrounding mass of tough connective tissue. The vein has been filled above with a firm laminated coagulum, which is closely adherent to its inner coat. On both sides of the obliteration the calibre of the vein is undiminished. The contiguous portion of the artery is quite healthy. The changes were probably the result of injury. 1340

1286. An inferior vena cava, wounded during the operation of nephrectomy. The wound, which is marked by a bristle, is about 3 mm. in length, and is situated just above the entrance of the right renal vein. Above the wound the vein contains a small coagulum. On the posterior aspect of the specimen are seen two silk ligatures which were applied to the pedicle of the kidney.

The patient died 24 hours after the operation; no hæmorrhage had occurred from the wounded vein.

VARICOSE VEINS.

It is necessary to make a clear distinction between veins which are merely dilated from obstruction to the flow of blood through them and true varicose veins. In the former condition the walls are merely stretched without any marked change in structure, and if the cause of obstruction be removed they quickly return to their normal condition. In the latter there is a structural change in the coats of the vessel which is permanent. Varicose veins are increased both in diameter and length, and thus become extremely tortuous (1289). The dilatation is not regular, pouch-like or fusiform enlargements being met with here and there, especially at the situations of the valves (1291). If the dilatation be not very excessive the coats of the veins are thicker than natural and abnormally rigid, so that when divided transversely the vessel gapes like an artery. In the pouches or fusiform enlargements the coats may be abnormally thin. Small dilated vasa vasorum are sometimes visible in the diseased vein (1290); and the still greater enlargement of these, together with the tortuous main trunk, may form a plexiform arrangement almost like a cavernous nævus. On laying a varicose vein open, the valves are found to be incompetent, sometimes flattened against the wall, in other cases partially or completely destroyed (1291). Thus the weight of the column of blood is no longer broken, and this still further aggravates the tendency to dilatation; and should such a vein be opened either by wound or ulceration, the blood will flow from the proximal side even more freely than from the distal, and death from hæmorrhage may speedily occur (1289).

Varicose veins are most common in the lower limbs, but they are also found in connection with the testicle as varicocele, in the rectum as piles, in the pelvis and other situations. Some form of obstruction to the return of blood is probably the immediate cause, but this is often associated with some constitutional or hereditary predisposition.

Varicose veins lead to congestion, induration, and chronic inflammation of the parts from which they carry the blood.

Microscopic examination of a varicose vein shows that the chief change is in the middle coat, which is thickened by the formation of abundant new fibroid tissue and a varying amount of hypertrophy of the muscular tissue. The bundles of muscular fibre cells are separated one from another by the new connective tissue. In the pouch-like dilatations the middle coat may be thinner than natural. The inner coat is irregular and sometimes roughened; and this together with the slackened circulation through the dilated vein tends to favour coagulation. Small clots may form in the pouches, and becoming calcified may form small stony concretions known as phleboliths (1310). Calcareous plates are occasionally found in the walls of varicose veins, as in chronically inflamed arteries.

1287. Portion of an internal saphenous vein, thickened so as to look like an artery, and reduced in capacity from chronic inflammation. The connective tissue on its exterior is loose and healthy. 591

From a subject brought into the dissecting-room. The coats of the femoral vein were extensively calcified.

1288. Part of an injected femoral vein, showing a thick plate of earthy substance which has been formed in its walls. The deposit forms a branching process 2·5 cm. in length and 4 mm. wide. Near the lower end of the specimen is a similar, though much smaller, deposit. 590

1289. Portion of the skin of a leg, with part of one of the superficial veins injected. The vein is dilated, increased in length, and tortuous. The skin is adherent to the convoluted vein, and at the lower part presents a small rounded aperture through which a piece of glass has been passed. The aperture communicates by means of a small cutaneous branch with the varicose vein beneath. The small branch is itself varicose, and appears to have entered the main vein at the spot indicated by the curved piece of glass. A similar dilated cutaneous vein enters the convolution next above. The skin is pigmented and indurated from prolonged congestion; above the opening before noticed it is superficially ulcerated. The subcutaneous fat seems but little altered.

The patient was a young man who was brought to U. C. H. for hæmorrhage from the small opening shown in the specimen. He died from loss of blood before reaching the hospital. At the post-mortem examination water injected by the external iliac vein flowed freely from the opening, showing that the valves were incompetent, and that the fatal hæmorrhage came from above and not from below. It will be noticed that the hæmorrhage did not come from the main trunk, but from a small dilated vein lying in the cutis. During life this would have been visible on the surface as a small elevated blue spot, which could have been made to disappear by pressure.

1290. A mass of varicose veins from the inner side of the thigh, injected. At the lower part of the specimen is a tortuous plexus of veins formed chiefly by the internal saphenous and a large tributary, dilated, lengthened, and bent upon themselves in numerous S-shaped turns. Some smaller dilated veins join the mass at different points. After the union of the tributaries the saphenous forms a trunk 12 mm. in diameter and for a short distance straight in course, but at the upper part again tortuous. The dilatation of the veins is greatest at the points of their greatest curvature. The injection has not penetrated the vasa vasorum, but here and there dilated vessels may be seen ramifying on the surface of the dilated veins. The specimen was injected from the external iliac vein, the valves being altogether incompetent.

1291. A varicose saphenous vein from the lower part of the thigh, laid open. The coats of the vein are thickened and unnaturally opaque. At the upper part of the specimen, immediately below the entrance of a small tributary, are two crescentic marks, indicating the situation of a valve which has undergone complete atrophy. Immediately below their union each of the two venous trunks which form the specimen is marked by a pouch-like dilatation. That in the left lies immediately below the cusp of a valve, which has apparently been rendered incompetent by the resulting distortion. In the right trunk, at about the same level, is a valve, above the left cusp of which, and below the right are considerable dilatations. Still lower is another valve, below which the vein is again dilated and lengthened into an irregular capacious sinus.

This specimen shows that although the dilatation takes place most extensively in the immediate neighbourhood of the valves, the pouches so formed are not necessarily mere exaggerations of the natural enlargements opposite the flaps.

1292. Plaster cast of a leg, in which the veins are exceedingly varicose. The enlargement commences behind the malleoli, and is traceable upwards along the course of the external and internal saphenous veins, ceasing in the back of the leg at the ham, and continued along the inner side as far as the parts are shown in the cast. The veins on the back of the foot are distended, but not varicose. The enlarged vessels form an extensive knotty swelling in the calf. At the inner side of the knee the internal saphenous vein is dilated to about the size of the little finger, and forms a long serpentine ridge.

1293. Portion of a varicose internal saphenous vein, with the integument lying over it, from the inner side of the thigh of a post-boy. The vein is dilated and so increased in length as to form a series of closely-set transverse loops held together by firm supporting bands of connective tissue passing over and between them. The wall of the vein, although increased in area, is not thinner than natural; its canal is distended with coagulated blood. 3596

The thrombosis occurred during life.

1294. The lower part of an internal saphenous vein, together with part of the fascia lata and muscles of the thigh. The main trunk of the vein is not dilated or tortuous, but its walls are thickened. A tributary entering the lower part of the vein has been dissected in a considerable part of its length. It is tortuous, thickened, and dilated, especially at the points of greatest curvature; the lumen is imperfectly filled by a thrombus. A small branch passes from the muscles through the deep fascia into the varicose tributary last described.

1295. Part of a femoral artery and vein, together with the upper part of the internal saphenous vein. The wall of the saphenous vein is thickened, and its inner surface rugose; the valves are thickened and shrunken, and were probably incompetent. The femoral vein is similarly affected from the point of entrance of the saphenous as far as the next valve.

From the same case as the preceding specimen.

VENOUS THROMBOSIS AND PHLEBITIS.

Thrombosis, or coagulation of the blood in living vessels, is of extremely common occurrence in veins. Coagula formed after death may be distinguished from those formed during life by the following points :—

Post-mortem clots do not completely fill the vessels in which they lie ; they are not adherent to its walls. They are not laminated in structure, and are either uniformly dark red in colour, or those parts which have been most dependent during coagulation are red, while the upper parts may be colourless, the corpuscles having sunk down after the cessation of the circulation. Post-mortem clots usually end in long pointed processes, and similar processes extend into the tributary veins. They are often marked by casts of the valves.

Ante-mortem clots completely fill the vessels in which they lie (1300); they are more or less firmly adherent to the walls (1300); they are denser in structure and are usually laminated (1299). If old they are more or less completely decolorised, and the decolorisation is independent of position, being dependent upon the age of the clot, the oldest part being most completely decolorised. Long processes of post-mortem clot are often seen adherent to the extremities of ante-mortem clots.

A thrombus may undergo various changes :—

1. It may be absorbed, and the channel of the vein restored.
2. It may undergo changes similar to those that occur in the clot in a ligatured artery, and the vein may thus be permanently obliterated.
3. It may become broken up and a more or less considerable portion carried into the blood-stream. In the case of the systemic veins the portion of clot so detached may block the pulmonary artery or one of its branches (1305).
4. It may calcify. This occurs most frequently in the small coagula that often form in the sinuses behind valves. It is also occasionally met with in the veins of the pelvis. The calcified clots form small rounded stony masses, known as phleboliths, which are seldom more than a few millimetres in diameter (1310).
5. It may soften. This only occurs when the clot is invaded by micro-organisms from a focus of infective inflammation. The central parts of the clot become completely decolorised, and finally break down into a fluid closely resembling pus in appearance. This fluid, containing fragments of disintegrating clot, may be discharged into the circulation and, by lodging in distant parts, give rise to one form of pyæmia (1303).

Thrombosis is most commonly the result of changes in the wall of a vein following injury (1284) or acute inflammation. It is favoured by any condition interfering with the flow of blood through a vein, as in general feebleness of the circulation, or when the circulation is retarded by pressure, as from tumours or by strangulation of a part, &c. Venous thrombosis may also occur in association with acute specific diseases, septicæmia and pyæmia (1303).

Acute phlebitis.—In an inflamed vein the coats are swollen and redder than natural, the endothelial lining loses its natural lustre, and very early becomes covered with a thin adherent layer of clot. The redness caused by post-mortem staining must not be mistaken for the redness of inflammation ; in the former there is no swelling of the coats of the vein, and the smoothness of the endothelium is unchanged.

Acute phlebitis may follow any form of acute inflammation of the surrounding tissues ; it may occur in connection with certain infective processes, such as pyæmia and septicæmia ; and in a simple form is a common complication of varicose veins of the lower extremities. The most important result of acute phlebitis is thrombosis, and in the most severe forms of phlebitis associated with infective inflammations the clot may break down, as before described, and cause embolic pyæmia (1312).

1296. Portion of a femoral vein, with the corresponding part of the femoral artery, from a man in whom the superficial veins were varicose and became inflamed. The wall of the vein is thickened, and its interior is imperfectly lined with disintegrating coagulum.

The artery and the vein are both more tortuous than natural. 3601

From a man, 70 years of age, in whom the phlebitis was attributed to exposure to cold.

1297. Portion of a femoral vein, the wall of which is thickened. Behind one of the valves a clot has formed, perhaps in consequence of extreme feebleness of circulation. 5232

1298. Portion of a vein in which a similar form of thrombosis has occurred. Adhering also to the inner wall of the vessel, for a short distance above the coagulum, is an incomplete layer of fibrin. The tributary veins entering above and below the valves are filled with coagulated blood. 5045

1299. The lower part of an abdominal aorta and the iliac arteries with the accompanying veins. The iliac veins are full of coagulum, which extends into and fills the portion of the vena cava shown in the specimen; the coagulum is distinctly laminated. The walls of the left common iliac vein present the appearances of inflammation; the contained clot appears to have been in process of disintegration. The walls of the right common iliac vein are but little affected. The thrombus was probably formed, therefore, in the vein of the left side, from which a secondary extension has occurred into the right iliac vein. 3778

1300. The lower part of an inferior vena cava with the iliac veins, the latter being filled with a firm thrombus which reaches for a short distance into the vena cava. On the left side, near the entrance of the internal iliac, the walls of the vein have been much altered by inflammation, and surround a firmly adherent portion of the clot; above this, the coagulum is decolorised and appears to have been softening. 2388

The thrombosis probably extended into the veins shown from the internal iliac of the left side, the phlebitis opposite the softening portion of the clot being due to its infective properties.

1301. Part of a subclavian vein, with the internal jugular entering it. The jugular vein is throughout opaque, and coated with a film of fibrin. The subclavian vein is unaffected. 4107

The changes in the vein extended downwards from the lateral sinus, and occurred as a complication of suppurative otitis media. (Dr. Garrod's *Case-book*, April 1854.)

1302. Portion of an internal saphenous vein, the wall of which is thickened from inflammation. The lower part of the vessel was completely occluded. The connective tissue around was indurated and adherent.

From a man who died of erysipelas of the thigh, consequent on extensive laceration from the bite of a horse. In the recent state the layer of fibrin on the inner coat of the vein was of bright orange, the coloration being due to softening and disintegration of the clot.

1303. The popliteal, femoral, and external iliac veins. The popliteal and lower part of the femoral vein are intensely inflamed, their walls being thickened and rigid. In the recent state the inner coat was lined with a layer of tenacious puriform fluid. Above this, the walls of the vessel are less swollen, and the vein contains a disintegrating clot; still farther upwards the coagulum is firmly adherent and laminated. 4215

From a man who died of erysipelas and pyæmia after amputation of the great toe.

1304. Part of a uterus with its appendages, and the entire length of the ovarian and renal veins of one side, with a small piece of the inferior vena cava. The uterus is hypertrophied, its sinuses large, and its interior denuded of mucous membrane.

showing it to have been recently pregnant; the sinuses are compressed and contain narrow filiform coagula. The interior of the ovarian vein bears evidence of having been recently inflamed, being lustreless and thickened; adherent to its altered inner coat is a thin layer of coagulated blood. The renal vein presents similar changes; and both veins were deeply blood-stained. 908

From a woman, who died of puerperal fever. The ovarian vein was probably filled with a thrombus, which, after disintegration, was carried into the circulation, and caused the complication of which the patient died.

1305. The left half of the pelvis, together with the pelvic viscera, of a female. The iliac veins, and many of the tributaries of the internal iliac, have been dissected and laid open. The external iliac vein is healthy; the internal iliac vein is imperfectly filled with loosely adherent thrombus. The thrombus is not continuous, and a large irregular mass occupying the upper end of the vein projects into the common iliac. The prolongations of the thrombus extend from the internal iliac vein into several of its tributaries. In the case of the vaginal veins the clot extends into the smallest branches which have been dissected.

There is no evidence of disease in the generative organs.

From a young woman, who was admitted into U. C. H. with obscure pelvic symptoms and signs of disease in the right hip-joint. She had had gonorrhœa. The affection of the hip was regarded as hysterical, and was treated with the cautery. Whilst walking across the ward the patient fell down dead. At the *post-mortem* examination the pulmonary artery was found to be filled with a large clot. The upper extremity of the right femur is preserved among the specimens of Diseases of the Joints, No. 818A. (Mr. Heath's *Case-books*, 1885, vol. i. p. 1.)

1306. An external iliac vein, with part of the femoral, the vessels being occluded by a firmly adherent coagulum. The coagulum is continued into the healthy vein above by a pointed non-adherent end. The walls of the vein opposite are swollen from inflammation. 1812

From a case of phlegmasia dolens.

1307. Portions of the common and external iliac veins. The wall of the vein is swollen; its inner coat has lost its natural polish and gives attachment to small fragments of clotted blood. At the lower part of the specimen is a portion of a thrombus, the central part of which has disintegrated; the portion remaining is firm and laminated. The tributaries entering the vein are everywhere filled with adherent clot. The inflammatory condition of the vein is presumably due to the thrombosis. 906

From a case in which death followed parturition.

1308. Portion of an external iliac vein and the upper part of the femoral. The vein is filled with a firm laminated coagulum, adherent above to the inner coat of the vessel. The wall of the vein is thickened, white, and firm, and united with the surrounding consolidated tissues. 905

From a case of phlegmasia dolens.

1309. The lower part of an inferior vena cava with the iliac veins. Adherent to the interior of one of the common iliac veins is a cylindriform coagulum; the corresponding internal iliac vein is lined with disintegrating fibrin, and its walls are swollen from inflammation. 949

From a case of phlegmasia dolens.

1310. The ovaries, broad ligaments, and Fallopian tubes from a woman aged 37. Some of the branches of the ovarian vein on each side contain a few small phleboliths, varying in size from a pea to a millet-seed. The vessels containing the phleboliths are obliterated, being represented merely by fibrous cords between them. Their coats are firmly adherent to the calcareous masses.

1311. The lower part of a urinary bladder, with the prostate gland and vesiculæ seminales. In the venous plexus on the base of the bladder are numerous calcified thrombi (phleboliths) of the size and shape of peas; some of them lie around the lower ends of the ureters. The surrounding connective tissue is loose and healthy, and shows no signs of previous inflammation. 3840

1312. A right tonsil, together with part of the internal jugular vein and the common facial vein, with a small radicle entering the latter from the outer surface of the tonsil. The tonsil is enlarged, and a clot occupies the jugular vein.

From a man, aged 26, who was admitted into U. C. H., under the care of Dr. Roberts, Oct. 2, 1897, having been ill for a fortnight. The right tonsil was enlarged and sloughy. and there was a swollen gland below the right angle of the lower jaw. The right tonsil was incised, but no pus found. Several severe rigors occurred, and the patient died on the second day.

At the *post mortem* examination both the tonsils contained pockets of pus; the internal jugular and innominate veins of the right side were filled with decolorised clot, in parts softening and extending a short way into the subclavian vein and vena cava. There were numerous infarcts with yellow purulent centres in both lungs; the spleen was large and soft. (Dr. Roberts's *Case-books*, Males, 1897, p. 436.)

1313. The lower extremity of a vena cava, together with the two common and external iliac, and part of the femoral, veins. From the bifurcation of the vena cava as low as the origin of the deep femoral vein the vessels contain large, irregular, adherent thrombi. In some places the thrombi extend into the pockets behind the cusps of the valves, and in one of the valves of the left vein a small thrombus fills the pocket, but does not extend beyond it. The walls of the veins are everywhere thickened, in some places more markedly than others, with the production of raised, yellow, opaque patches in the inner surface. 8596

Examined microscopically, one of the thickened patches in the wall of the vein presents a dense fibrous structure.

From a man in whom gangrene of both feet occurred. The arteries are preserved in No. 1164.

Implication of Veins by Tumours.

A vein is never the seat of a primary tumour, but a malignant growth, sarcomatous or carcinomatous, when situated in immediate contact with a large vein, may penetrate its coats, and grow upwards and downwards in the lumen of the vessel (1317). Coagulation usually takes place upon the growth, and the vein thus becomes occluded; but before this occurs, fragments of the tumour are often washed on, and, lodging in the lungs, produce secondary growths. Probably the same process occurring in the more minute veins is the mode of dissemination of sarcomata, which, as a rule, are spread by means of the circulation without affecting the lymphatics.

1314. Portions of the large veins at the root of the neck on the right side. In the wall of the external jugular vein there has grown a lens-shaped tumour, the new growth being placed edgeways in the length of the vein and nearly filling its cavity. The inner coat of the vein is entire. 4054

1315. Portion of an inferior vena cava, in the wall of which a flattened sarcomatous tumour has grown. The surface of the growth is everywhere covered by the inner coat of the vein, and is slightly lobulated. The growth has an undulatory, somewhat triangular, outline, and measures about 3 cm. along its longest side. 4055

From a case of multiple small round-cell sarcomata (see No. 1138).

1316. A wax model of a vein laid open to display a well-defined, lobulated, malignant tumour which has grown in its walls and almost surrounds the vessel. The growth is spread over about 5 cm. of the length of the vein, and completely occludes it. 4873

1317. Part of an inferior vena cava, the lumen of which is completely blocked and distended by a friable carcinomatous growth. On the posterior aspect of the specimen the tumour has destroyed the wall of the vein. 8187

The primary growth was in the kidney, and invaded the interior of the vein by direct continuity.

DISEASES OF THE LYMPHATIC GLANDS.

Acute Inflammation of Lymphatic Glands.

The most common cause of acute lymphadenitis is the absorption by the lymphatics of the various toxic and infective materials produced in connection with different inflammatory affections, especially of the skin and mucous membranes. Very frequently suppuration results, with the formation of an *acute glandular abscess.* The suppuration may occur as a single collection, or numerous purulent foci may be scattered through the gland-substance (1318), and, especially in the more virulent forms, this suppuration may extend to the periglandular tissue, so that the gland, attached only at its hilum, lies in an abscess-cavity.

1318. A superficial inguinal gland in which acute suppuration has occurred. The gland is enlarged, and the section displays a large number of yellow foci of suppuration scattered through the pale pink gland-substance. 8709

From a man, aged 30, who, whilst lifting a heavy weight, felt a sudden pain in his left groin, followed by a swelling which was at first mistaken for a hernia. Suppuration followed, and the gland was removed. There was no evidence of venereal disease, or of any other source of infection. No micro-organisms could be cultivated from the pus.

Tuberculous Disease of Lymphatic Glands.

Tuberculous disease of lymphatic glands is very common. The glands are enlarged, and in the early stage present on section a fleshy semitransparent appearance. As the disease advances opaque yellow spots appear and coalesce, until the whole gland may be converted into a firm yellow caseous mass (1319). At the same time the capsule is thickened, and, as the result of chronic inflammation outside it, the gland becomes adherent to surrounding structures and to neighbouring glands (1322). Having reached this stage the disease most commonly ends in chronic suppuration; the capsule of the gland is perforated, the chronic abscess approaches the surface and is finally discharged, leaving sinuses leading down to the remains of the diseased gland-tissue (1321). In other cases the caseous gland may long remain quiescent, the cheesy material becoming hardened and often calcareous.

Tuberculous disease is very common in the glands of the thoracic and abdominal cavities. Of the external glands, those of the neck are most commonly affected and next in frequency the axillary. Tuberculous disease of the cervical glands is usually preceded by a simple lymphadenitis following some source of irritation in the corresponding lymphatic area, especially of the mouth or throat. The subsequent infection of the inflamed gland with the tubercle bacillus may probably occur either from the same source, without the occurrence of any obvious tuberculous lesion of the mucous membrane, or through the blood-stream.

In other cases the tuberculous infection of a lymphatic gland is secondary to a primary tuberculous lesion in some part of the corresponding lymphatic area.

1319. A group of tuberculous cervical glands. The outline of the separate glands is somewhat obscured by the inflammatory products surrounding them and binding them together. The section shows that the capsules of the several glands are considerably thickened, and in most parts they have evidently been adherent to the surrounding tissues. The normal tissue of the glands has been entirely replaced by firm, yellow, caseous material arranged in lobes connected together by dense, opaque, fibroid tissue.

From a man, aged 23, under the care of Mr. Barker. The patient was of delicate health, and there had been a painless enlargement of the glands in the left posterior triangle of the neck for several months. There was no other evidence of tubercle. The glands were excised.

1320. Two tuberculous axillary glands in section. The larger gland consists of several caseous lobules, softening in places and bound together by dense, white, fibrous tissue. The smaller gland is more uniform in appearance, and is beginning to soften at one spot. 6459 A

From a woman, aged 24, under the care of Mr. Barker. The swelling in the right axilla was of 18 months' duration. Four sisters and several brothers had died of consumption. The glands were excised.

1321. A wax model of the right side of a child's face and neck showing extensive tuberculous disease of the lymphatic glands in the anterior and posterior triangles. The enlarged glands form several superficial swellings. The skin below and behind the jaw presents several discharging sinuses and an irregular cicatrix. An ulcer in the skin of the chest-wall was probably the result of tuberculous disease of the sternum or of a rib-cartilage. 2548

1322. A chain of tuberculous lymphatic glands. The glands are fused into two chief masses, attached to which are three or four separate glands. The masses and the separate glands are connected by enlarged lymphatic vessels. In the two large masses the outlines of the separate glands can be recognised, though they are closely united by fibroid tissue developed as a consequence of inflammation extending beyond the capsules (periadenitis). The section of some of the glands shows the capsule thickened. The normal tissue of the gland has been replaced by opaque, yellow, caseous matter, for the most part firm, but here and there commencing to soften. 5719

The glands were removed by operation.

LYMPHADENOMA.

Lymphadenoma is characterised by a progressive enlargement of the lymphatic glands. The enlarged glands are firmer than natural; on section they are white or pink in colour without any distinction between the cortical and medullary parts; they may be stained by hæmorrhage, but very rarely show any sign of fatty degeneration or caseation. Even in the later stages the individual glands of a group may remain separate one from another (1323), but, especially if the glands are unusually fibrous, adhesion may occur (1325). Microscopically the structure of the enlarged glands resembles more or less closely that of the cortex of a normal lymphatic gland, but with usually an excess of fibrous tissue. Lymphadenoma may be limited to a single group of glands, most commonly those of the neck or axilla, or the disease may involve all the glands in the body. In the latter case the glandular enlargement, associated with enlargement of the spleen and anæmia, constitutes the affection known as "Hodgkin's Disease." There may be similar overgrowths of the lymphoid tissue in the alimentary tract and liver, and deposits of the same structure have been met with in the bones and skin and elsewhere.

Only those cases in which a limited group of glands is affected are suitable for operation (1323).

1323. A large mass of lymphadenomatous glands, removed from the neck of a boy. They form a chain connected by large lymphatic vessels. The glands vary in size from that of a pea to that of a hen's egg. They have turned out smoothly from the surrounding tissues, having evidently been loosely encapsuled in areolar tissue. A section carried through one of the larger glands shows that it still retains the general form of a lymphatic gland. The gland is composed of a number of separate lobules corresponding to the follicles of a normal gland, but greatly enlarged; its capsule is thin. The tissue of which the lobules are made up differs little to the naked eye from that composing the cortical substance of a healthy gland; it shows no tendency at any point to caseate or soften.

Microscopic Structure.—The growth has the structure of lymphoid tissue, intersected by fibrous bands.

From a boy, aged 15, admitted into U. C. H., under the care of Mr. Barker, in 1885. The glandular enlargement in the left side of the neck was of three years' duration. There was no enlargement of other lymphatic glands or of the liver and spleen. Blood-corpuscles: red, two-thirds of the normal amount; white, 1 to 100 red. The glands were removed through an incision extending from below the lobule of the left ear to the sterno-clavicular articulation. The internal jugular vein was freely exposed. The patient made a rapid recovery. (Surg. Reg. Rep. 1885, p. 36, No. 582.)

1324. A large chain of lymphadenomatous glands removed from the axilla. The glands vary from 1 cm. to 6 cm. in diameter. The individual glands are loosely held together by lymphatic vessels and areolar tissue; they are smooth and have evidently been easily shelled out from the surrounding tissues. The largest gland has been cut through; the divided surface presents a uniform fleshy substance with a tough white fibrous centre; there is no caseation, and the capsule of the gland is thin.

Microscopic Structure.—The growth has the structure of lymphoid tissue, but the condition of the specimen renders microscopic examination unsatisfactory.

From a patient under the care of Mr. Quain.

1325. Half a lobulated mass of lymphadenomatous glands, measuring 19 cm. by 8·5 cm. The lobules on the surface of the mass correspond to the individual glands of which it is composed. The surface of each lobule is smooth and covered with loose areolar tissue, indicating that the connections with the surrounding tissue were loose. On the cut surface the outlines of the separate glands are clearly recognisable, but the glands are for the most part firmly bound together by dense fibrous tissue. The glands present a nearly uniform fleshy substance, free from caseation, and intersected, especially in the case of the largest gland, by fine fibrous bands.

Microscopic Structure.—A section of the firmer part of one of the glands consists almost entirely of delicate fibrous tissue, containing small rounded and a few larger rounded cells. In some areas the structure is much more cellular and resembles that of ordinary lymphoid tissue.

PRIMARY TUMOURS OF LYMPHATIC GLANDS.

Sarcoma, usually of the small round-cell variety, is the only tumour which occurs as a primary growth in the lymphatic glands.

SECONDARY TUMOURS OF LYMPHATIC GLANDS.

The lymphatic glands are very commonly the seat of secondary tumours of various kinds.

All carcinomata tend to infect the nearest glands. The secondary growth agrees in structure with the primary tumour, whether it be squamous, columnar, or spheroidal-cell carcinoma. Sarcomata, as a rule, do not infect the lymphatic glands; but the small round-cell sarcoma and melanotic sarcoma are exceptions to this rule. The secondary tumours are developed from cells carried from the primary growth by the lymph to the glands. In carcinomata the epithelial cells forming the essential part of the growth grow into the lymph-spaces of the tissue they are invading, and thus readily infect the glands. No lymphatics have been proved to exist in sarcomata.

1326. A femoral lymphatic gland, as large as a hen's egg, which is the seat of an extensively degenerated carcinomatous growth. The outer surface of the gland is irregular, and the surrounding fat is firmly adherent to it. The section displays an irregular central cavity surrounded by the undegenerated part of the growth which projects into the cavity in the form of irregular fibrous processes. 6458

The growth is a squamous-cell carcinoma, and was secondary to a growth on the back of the left leg, for which amputation had been performed 14 months previously. A secondary deposit in the femoral glands had been excised in the Middlesex Hospital 5 months previously. The gland preserved in the specimen was excised together with the overlying scar. The operation was followed by rapid recurrence. (Surg. Reg. Rep. 1889, p. 144, No. 2576.)

1327. Half a lobulated tumour removed by operation from the axilla, and consisting of a large glandular deposit of melanotic sarcoma and two smaller glandular deposits which are not pigmented; the whole tumour measures 9 cm. in its greatest diameter.

The cut surface of the tumour presents a peculiar appearance, resulting from a breaking-up of the tumour-substance into irregularly rounded areas by intersections of fibrous tissue. This appearance is most marked in the central part of the growth. The pigmentation is slight. 6480

Microscopic Structure.—The tumour is an alveolar sarcoma; it presents a fine reticulum enclosing small spaces which are occupied by large round cells with a single round nucleus. The pigment is for the most part contained in fasciculi of small spindle-shaped cells.

The tumour was removed by Mr. Beck from the axilla of a middle-aged woman, in whom there were numerous, small, pigmented moles on the chest and shoulders. None of the moles showed any signs of malignancy.

1328. A mass of glands from the groin, which are the seat of a secondary deposit of melanotic sarcoma, together with the small primary growth removed from the foot. The glands are seven in number, and the largest, which has been bisected, measures 4 cm. in diameter. The pigmented growth is readily recognisable through the capsules of the glands, and in the section of the largest gland the black pigment gives the cut surface a coarsely marbled appearance.

The primary growth forms an ulcer 1 cm. in diameter, in the base of which the growth, marked by lines of pigment, is recognisable.

Microscopic Structure.—A section of the small ulcer on the foot shows a nodule of growth in the base of the ulcer having the structure of a mixed-cell sarcoma. The cells are in many parts rounded, and the structure approaches that of an alveolar sarcoma. The pigmentation of the growth is very slight, but pigment is more abundant in the bases of the papillæ around the ulcer.

The parts were removed by Mr. Heath from a man, aged 45, who died a few months after the operation, probably from internal recurrences.

DISEASES OF THE LIPS.

Hare-lip. *See* Congenital Malformations.

Tumours of the Lips.

Mucous cysts are not uncommon on the inner surface of the lips and cheeks.

Angioma of the lips is common. It is usually of the cavernous variety (1330). It may occur as a single tumour or may involve considerable parts of one or both lips, and may be associated with similar growths on the inner aspect of the cheeks or of the tongue or floor of the mouth.

Lymphangioma of the lips occurs in the condition known as Macrocheilia.

Papilloma of the lips resembles similar growths in other parts of the body. Occasionally an excessive formation of epithelium takes place upon the warty growth, giving rise to a horny excrescence, which may attain a considerable size (1329).

Adenoma is found in rare cases growing in connection with the labial glands (1331).

Squamous carcinoma of the lip is very common, and affects much more frequently the lower than the upper lip. It is more common in men than in women. It first appears as a warty growth of small size which ulcerates early. The base of the ulcer is hard and indurated, its edges raised and everted, and its floor uneven and often sloughy (1333). A section through the growth shows that it infiltrates the neighbouring structures more or less extensively, and in the fresh state the almost pure white substance of the tumour contrasts strongly with the surrounding muscle. Similar growths are sometimes met with on the inner aspect of the cheeks. Secondary deposits in the glands below the jaw are common. After removal, carcinoma frequently recurs in the lymphatic glands and in the scar. Nos. 1338, 1339, and 1340 illustrate the extensive operations performed for such recurrences.

1329. A small horny excrescence, together with the portion of the border of the lower lip from which it has grown. The horny substance is arranged in long columns and laminæ set parallel one with another and vertically to the subjacent surface, and formed on greatly hypertrophied papillæ. 2629

1330. A venous nævus which was removed from a lower lip. The tumour forms an almost oval mass about 4 cm. in length and 2·5 cm. in breadth. It is covered in part by thinned skin, and in part by mucous membrane; the former has in places been destroyed by sloughing. The tumour now consists mainly of blood coagulated in the vessels composing it. 3547

It was removed by ligature from a lad under the care of Mr. Liston.

1331. Portion of a lower lip, in the substance of which a small spherical tumour has grown. The growth, which has a diameter of 12 mm., is distinctly circumscribed; it is probably an adenoma which has originated in one of the labial glands. Near its surface portions of the tumour have a semigelatinous aspect, like boiled sago. 535

Microscopic Structure.—The tumour consists of a delicate fibrous stroma, which in some parts presents collections of fat cells and in other parts is replaced by a hyaline ground-substance containing small, branched connective-tissue cells. Throughout the tumour are epithelium-lined spaces. These spaces are exceedingly irregular in size and shape, some having the form of long irregular clefts, others being smaller and more rounded in shape. The epithelium lining the spaces presents very varying characters; in some parts it appears as a more or less regular layer of cubical or columnar cells, but in many spaces the epithelium has proliferated so as to form polypoid projections or even more or less completely to fill the lumen.

The parts were removed by Mr. Liston from an old man, in whose lip the tumour had been growing for ten years.

1332. A V-shaped portion of a lower lip, measuring 3·5 cm. across its base, removed for carcinoma. On the cutaneous aspect the growth has an oval border separated by nearly 1 cm. from the divided edge of the skin; in its centre is an uneven ulcerated pit, and over the rest of its extent the tumour has a fissured surface as if excoriated; the margins of the ulcer rise above the level of the surrounding skin. The raised edge forming the right border of the ulcer presents many small round depressions, apparently enlarged cutaneous follicles. The growth has infiltrated the entire thickness of the lip, and projects posteriorly beneath the mucous membrane, which has for the most part been infiltrated by and is ulcerated over it. The edge of the ulcer is raised and markedly everted. The amount of disease on the deep aspect is considerably greater than on the cutaneous; the two ulcerated surfaces appear to have been continuous by a fissure crossing the free border of the lip. 3580

From a patient under the care of Mr. Liston.

1333. The whole of the right half of both lips, with the part of the cheek adjoining the angle of the mouth, removed by operation. The borders of the lips have been extensively destroyed by an ulcerating carcinoma. The lower lip is the chief seat of the growth, and is everted and considerably increased in thickness; the ulcerated surface is uneven and coarsely granular. Close beyond the corner of the mouth is a small globular extension of the growth, over which the skin is adherent and infiltrated. On the back of the removed parts the ulceration is considerably more extensive, and reaches to the outer and lower edge of the specimen. 5379

From a young man, aged 21, under the care of Sir J. Erichsen. The patient had been in the hospital some time previously, and was at first treated for syphilitic ulceration of the mouth. The disease was of about eighteen months' growth; no cause for its appearance was assignable. The growth was freely removed, the wound being repaired by a plastic operation. The disease recurred very rapidly in the scar, and the patient left the hospital to return to the country in a hopeless condition.

1334. Sections of a portion of a lower lip excised for carcinoma. The growth is confined to the mucous aspect of the lip, and is covered with an oval, brownish-black, horny scab. The disease, as displayed by the section, has no well-defined limit, and on either side extends to the edges of the parts removed; along the margin of the growth are sections of some of the labial glands. The substance forming the tumour is of a milky whiteness and firm in structure; in many parts the areolar tissue and muscular fibres of the lip are discernible in its midst.

1335. Part of a lower lip, together with the adjacent part of the right cheek, removed for carcinoma. On the cutaneous aspect the growth has an irregularly quadrilateral outline and measures 6 cm. vertically and 4·5 cm. from side to side, extending from the free edge of the lip downwards nearly to the point of the chin. The growth presents an irregularly tuberculated surface, and except at the lower part the border is abruptly raised. The tumour involves the whole thickness of the lip, and appears on the posterior surface in an irregularly oval area, much smaller than that occupied by the cutaneous part of the growth. At the lower part of its posterior surface, where the growth was adherent to the front of the jaw, the cut surface has a dead-white colour contrasting with that of the surrounding muscle. 6400

Microscopic Structure.—A typical squamous carcinoma.

From a man, aged 55, who was admitted, under the care of Mr. Beck, into U. C. H., Oct. 1888. The growth began as a hard brown spot on the lip six months before admission. The portion of the lower jaw to which the growth was adherent was removed. The defect in the lip left by the removal of the tumour was repaired by a plastic operation. There was no evidence of recurrence three years after the operation. (Surg. Reg. Rep. 1888, p. 40, No. 1874.)

1336. The whole of a lower lip together with a V-shaped portion of the skin below, removed by operation for squamous carcinoma. The growth involves the whole of the free border of the lip in its whole thickness, and extends downwards on the cutaneous surface with an irregularly V-shaped outline to a point 3 cm. below the free margin of the lip. On the mucous surface the growth is only half as extensive as on the cutaneous surface. The surface of the tumour, which is raised about 6 mm. above the surrounding skin, is coarsely papillomatous in appearance: the edges are abruptly raised and in many parts distinctly overhanging. 6978

Microscopic Structure.—The tumour is a typical squamous-cell carcinoma.

From a man, aged 77, in whom the growth on the lip, which began as a wart, had existed for fourteen months. The lip was repaired by a plastic operation. (Surg. Reg. Rep. 1893, p. 46, No. 491.)

1337. The left angle of a mouth, together with a V-shaped portion of the whole thickness of the adjacent part of the cheek. On the mucous surface of the cheek there is a carcinomatous ulcer, which extends up to the angle of the mouth and for a distance of 1·5 cm. involves the mucous surface of the lower lip. The ulcer measures 2 cm. across and presents a somewhat warty surface. 6977

1338. Part of a lower jaw, including the symphysis and the body on either side for about 2·5 cm., together with the soft parts forming the chin and middle of the lower lip, the whole being removed for carcinoma. The growth has invaded the entire thickness of the soft parts, and is intimately adherent to the bone; its upper part is deeply ulcerated, the edges of the ulcer being sinuous and slightly raised and rounded.

From a man, aged 58, admitted under Mr. Heath's care, May 17, 1876. About eighteen months previously the patient noticed a small crack on the inner side of the lower lip, which, after increasing, healed up, a firm swelling having, however, by this time formed in its situation. In July 1875 the patient went into the Maidstone Infirmary, where the diseased parts were removed. In December a fissure reappeared in the same spot, a growth subsequently appearing on either side of the fissure.

The patient was in the habit of smoking a clay-pipe, holding it to the left corner of the mouth, where he first noticed the fissure.

In May 1876 the parts preserved in the specimen were removed by operation.

The patient was attacked with bronchitis, and, in addition, the wound was affected, on the tenth day after the operation, with erysipelas, and the patient died on the following day. (Mr. Heath's *Case-books*, 1876, vol. i. p. 76.)

1339. The anterior part of a lower jaw, removed by vertical division behind the second bicuspid teeth, together with the soft parts of the chin. Involving the skin of the chin is a large carcinomatous ulcer, measuring 6 cm. transversely. The ulcer presents an irregular nodulated surface and a raised sinuous border, which in many parts is considerably everted. There is no evidence of disease on the divided surface of the jaw or soft parts. 6781

Microscopic Structure.—The growth is a squamous-cell carcinoma.

From a man, aged 29, who was admitted into U. C. H., under the care of Mr. Heath, on Nov. 30, 1891. A growth on the lower lip of two years' duration, and believed to be due to the irritation of a tobacco-pipe, had been removed in Malta on April 11, 1889. Before the operation an enlarged gland had been detected in the right side of the neck. In June 1891 a swelling of the chin was first noticed and in August ulceration occurred. On admission there was a scar in the lower lip near the right angle of the mouth, an extensive fungating growth on the chin adherent to the jaw, and enlarged glands on both sides at the upper part of the neck. The parts preserved in the specimen were removed by operation on Nov. 25, 1891. The patient left the Hospital Jan. 27, 1892; several small sequestra had separated from the jaw and the wound was not quite healed. (Mr. Heath's *Case-books*, 1892, vol. i. p. 262.)

1340. The soft parts forming the chin, together with the lower part of the body of the jaw for about its middle 7 cm., the whole being removed for recurrent carcinoma. The growth forms a prominent oval mass, measuring about 9 cm. from side to side, and closely surrounding the lower border of the jaw; on the left side a portion of the bone has been replaced by nodules of tumour-substance; the tumour projects posteriorly, so as to fill the concavity of the jaw for a distance of 5 cm. The skin is almost everywhere intimately united to the substance of the tumour, and is in places raised in round and oval swellings by extensions of the growth; in these situations the integument is smooth, thinned, and apparently infiltrated. In two or three places ulceration has spread very deeply into the main substance of the growth, which is extensively hollowed, and beyond this into the parts beneath the floor of the mouth. The tumour is composed of an opaque, firm, homogeneous substance, intersected by scanty lines of white fibrous tissue.

From a man, aged 55, a fisherman, admitted under Mr. Heath's care, Nov. 1875. Four years before admission an ulcer formed in the lower lip close to the left angle of the mouth.

In Feb. 1872, about twelve months after the first appearance of the disease, the patient went into the Monmouth Hospital, where the growth was removed by a V-shaped incision.

About twelve months before admission into U. C. H. a small swelling appeared under the front of the lower jaw on the left side, and about four months before admission the growth commenced to ulcerate.

The diseased mass was removed by making an incision around it to the bone, which was then sawn through in the same plane. The mouth was not opened, nor the alveolar border of the jaw injured. The extensive surface resulting was left to heal by granulation. Cicatrisation was not complete when the patient left the hospital, Dec. 23, 1875. The disease returned soon afterwards, and ended fatally in a few months. (Mr. Heath's *Case-books*, 1875, vol. i. p. 418.)

DISEASES OF THE JAWS AND GUMS.

Inflammation of the Gums and neighbouring Mucous Surfaces.

The numerous inflammatory affections to which these parts are liable cannot be illustrated by Museum specimens.

Gangrenous stomatitis or *Cancrum oris* usually commences in the mucous membrane of the cheek, and rapidly extending to the skin may lead to extensive destruction of the soft parts (1341). The disease occurs in childhood, and is usually fatal. If recovery occurs great deformity may result and the jaws be immovably bound together by the cicatrix.

1341. A wax model of the face of a child who died of cancrum oris. In the left cheek is an oval opening, measuring 4 cm. and 3 cm. in its chief diameters; through this opening, which is as large almost as the mouth itself, the dental arches and tongue are plainly visible. The edges of the ulcerated gap are slightly uneven or jagged, and are neither inverted nor everted, the opening appearing as if cleanly punched out; its deeper parts are covered with sloughs. 2524

1342. A tongue together with the tissues of the floor of the mouth and adjacent parts. As the result of a gangrenous inflammation, the mucous membrane of the anterior part and the whole of the right side of the floor of the mouth has been destroyed, leaving a ragged shreddy surface of a brownish colour. Posteriorly on the right side the destructive inflammation extends backwards as far as the anterior pillar of the fauces and extends upwards into the cheek. Both the sublingual salivary glands are exposed. The disease has not extended to the tongue. 5889

From a boy, aged 12, who was admitted into U. C. H., under the care of Mr. Heath, on Jan. 31, 1883. About a week before admission a raised black area was noticed on the inner surface of the right cheek. On admission the lower gum on the right side was spongy and ulcerated and, opposite the first molar tooth, covered with a greyish slough; nitric acid was applied under chloroform. On Feb. 2 the cervical glands were tender and swollen. On Feb. 7 the ulceration, which was spreading, was scraped and cauterized. On Feb. 10 there was a papular rash on the buttocks and legs. Sloughing in the mouth continued to spread and death occurred on Feb. 18. At the *post mortem* examination the sloughing in the mouth was found to have extended along the left lower gum as far as the first molar tooth. The right side of the lower jaw was bare as high as the tip of the coronoid process, and there was extensive sloughing in the right cheek. There was broncho-pneumonia of the right side and both pleuræ contained fluid. There were petechiæ in the pleura, pericardium, endocardium, and beneath the capsule of the right kidney. There were numerous hæmorrhages on the inner surface of the dura of both hemispheres and hæmorrhages in the right retina. (Mr. Heath's *Case-books*, 1883, vol. i. p. 151.)

1343. Part of a left upper jaw from a case of acute leukæmia, showing considerable swelling of the gum, which, especially on the inner aspect, is grey and sloughy. 7773

From a man, aged 19, who was admitted into U. C. H. Feb. 22, 1897. The chief symptoms were pallor, wasting, glandular enlargement, petechiæ on the trunk and limbs, and fever. The teeth in the left upper jaw were very loose and embedded in a large fungating mass involving the gum on both sides of the alveolus and the adjacent part of the roof of the mouth; the mass was soft and ulcerated in two places and bled readily, the gums in other parts were red and spongy. The patient died on March 5. There were lymphoid deposits in various organs with hæmorrhages. (See Bradford and Shaw, "Acute Leukæmia," Med. Chir. Trans. vol. lxxxi. 1898, p. 343.)

1344. Part of the alveolar border of the right upper jaw from a case of acute leukæmia. On the outer aspect the gum is ulcerated.

From a boy, aged 7 years, who was admitted into U. C. H. March 15, 1897, and died on March 23. The chief symptoms were weakness, pallor, fever, glandular enlargement, and purpuric spots on the trunk and limbs; there was a sanious discharge from the nostrils, and swelling and ulceration of the upper lip; the breath was very offensive, and the gum of the right upper alveolar border and of the right side of the lower jaw was swollen and ulcerated and bled readily. At the *post mortem* examination petechiæ were found in various situations, and small lymphoid deposits in some of the organs. (See Bradford and Shaw, "Acute Leukæmia," Med. Chir. Trans. vol. lxxxi. 1898, p. 355.)

NECROSIS OF THE JAWS.

Necrosis of the jaws is very common, the lower being more frequently affected than the upper. The most important cause is an inflammation, usually with suppuration (alveolar abscess), beginning in connection with the teeth; the necrosis may be limited to the wall of an alveolus or may involve the alveolar border, or even a considerable part of the body of the jaw (1352). Necrosis, usually limited to the alveolar border, is not uncommonly the result of ulceration of the gums, leading to exposure of the bone, and may thus follow the various forms of ulcerative stomatitis, mercurial stomatitis (1345), and ulcerating growths. Necrosis of the jaws may also occur as a complication of certain of the acute specific fevers, such as scarlet fever, measles, and typhoid fever (1348).

Syphilitic necrosis is most common in the palatine processes of the upper jaw, and is usually associated with loss of substance in other parts of the bony and cartilaginous boundaries of the nasal cavities (588).

A special and sometimes very extensive form of necrosis of the jaws is met with as the result of phosphorus poisoning.

Necrosis occasionally follows fractures of the jaws (31, 143).

The separation of sequestra from the jaws is often exceedingly slow, but the repair, even after extensive loss of substance, especially of the lower jaw, is often very complete.

1345. Two sequestra, including parts of the alveolar border of the upper jaw, together with some of the temporary teeth and sacs of the permanent ones, from a child about 9 years of age. 2656

The necrosis is said to have been caused by an overdose of mercury.

1346. Portion of the alveolar border of the upper jaw of a child, with two of the temporary, and the sacs of the replacing permanent, teeth, separated after necrosis. 5299

1347. Two small sequestra from the alveolar border of the upper jaw of a child together with the permanent second bicuspid and first molar teeth. 5538

From a girl, aged 7 years.

1348. A sequestrum removed by operation from the upper right alveolar border of a child. The sequestrum contains the sockets of four of the temporary teeth, and two unerupted permanent teeth are embedded in its substance. 6410

From a female child, aged 4 years, who had been under treatment in U. C. H. for typhoid fever. There was swelling of the right upper alveolus with an offensive purulent discharge. The sequestrum was removed with forceps. (Surg. Reg. Rep. 1888, p. 41, No. 1675.)

1349. An irregular sequestrum removed from the lower jaw of an adult. It measures 5 cm. in length, and includes in its lower part the whole thickness of the bone. The mental foramen is situated close to the anterior end of the sequestrum. 127

1350. Several sequestra taken from different patients, and involving various parts of the upper and lower jaws. 2914

1351. A sequestrum, including a large part of the right side and symphysis of a lower jaw, divided into two by a saw-cut. The surfaces of the sequestrum have been rendered very uneven, partly by ulceration and partly by a deposit of new bone, resulting from inflammation preceding the occurrence of necrosis. The teeth preserved in the specimen are healthy. 4848

1352. The right half of a lower jaw, excepting the neck and condyle. Extensive necrosis has occurred, the sequestrum being imperfectly enclosed in an involucrum, which consists partly of new bone and partly of those portions of the jaw which have escaped necrosis. There are two separate sequestra: one, very irregular in outline and nearly 3 cm. across, lies at the outer aspect of the lower part of the ramus; the other, 7 cm. in length, involves a considerable part of the outer surface and lower border of the body of the jaw. The incisor portion of the jaw is intact and the teeth from the left central incisor to the right first bicuspid are present. The irregular bony shell in which the sequestra are included is more perfect on the inner than the outer aspect of the jaw; the bone composing it presents a fine felt-like surface, and contrasts strongly with the perfectly smooth and whiter outer surface of the sequestra. 6845

From a man, aged 22, who was admitted into U. C. H., under the care of Mr. Heath, March 7, 1892. The necrosis of the jaw followed the extraction of a tooth at the end of December 1891. On admission the right half of the lower jaw was surrounded by great induration of the soft parts, in which were several soft areas of suppuration and one sinus at the anterior border of the sterno-mastoid. Bare bone could be felt through a mass of granulations in the socket of the first molar tooth. Death occurred during the administration of chloroform. (Mr. Heath's *Case-books*, 1892, vol. ii. p. 454.)

1353. Part of the right side of the body of a lower jaw, removed by operation and divided vertically. The portion of bone measures 8·5 cm. in length and is greatly thickened by chronic osteitis, resulting from the inclusion of a sequestrum and part of a tooth. The jaw measures 5 cm. vertically; its upper surface is covered by the mucous membrane of the gum, but the corresponding teeth are wanting. On the outer aspect of the jaw part of the bone has been cut away in order to display a small, irregular, imperfectly separated sequestrum and the fang of a tooth which are embedded in its substance. The section of the jaw shows it to consist throughout of very dense bone in which are seen numerous irregular rounded openings corresponding to the ramifications of the cavity in which the sequestrum lies. At no part does the cavity appear to have reached the surface of the jaw. 6929

From a woman, aged 31, who was admitted into U. C. H., under the care of Mr. Heath, on November 7, 1892. Three and a half years previously there had been swelling of the right half of the lower jaw in connection with several carious teeth which had been extracted. About one year before admission the swelling of the jaw increased, and several abscesses formed over it. On admission the enlargement of the jaw was thought to be due to an osseous tumour, and on November 16 the part preserved in the specimen was removed through an external incision. (Mr. Heath's *Case-books*, 1892, vol. ii. p. 351.)

Hypertrophy of the Gums.

True hypertrophy of the gums is a rare affection occurring in early life. It usually affects both jaws, and in advanced cases the teeth may be almost covered by the firm lobulated overgrowth. The hypertrophy involves chiefly the fibrous tissue of the gum and extends within the margins of the alveoli (1354).

Localised hypertrophy of the gums, sometimes forming a polypoid mass, is a not uncommon result of the irritation of carious teeth (1356).

1354. A portion of the right alveolar border of a lower jaw, 4 cm. in length, together with the corresponding part of the gum and some of the teeth. The gum is greatly hypertrophied, and in front of the second molar tooth the inner and outer portions have united over the crowns of the teeth, the fangs of which are seen in the cut surface of the alveolus. The wisdom-tooth was not removed, but the ring of hypertrophied gum surrounding it is included in the specimen. The slightly lobulated gum is everywhere covered with thin mucous membrane, and a section shows that the growth is composed of dense fibrous tissue, like that which forms the natural substance of the gums.

From a man, aged 26, under the care of Mr. Heath in 1887. The affection had been noticed from early childhood, and the overgrowth of the gum extended from the right wisdom-tooth to the left canine, giving rise to considerable deformity and occasioning much thickness of speech. The part preserved was removed with bone-forceps, the free hæmorrhage being stopped by the cautery. Patient made a good recovery. (Heath, 'Injuries and Diseases of the Jaws,' 1894, p. 230.)

1355. The alveolar border of the upper jaw of a child. In its whole length the gum is hypertrophied so as almost to conceal the teeth. The overgrowth is more marked at the two extremities and on the inner than the outer aspect.

From a female child, aged 4½ years, admitted into U. C. H., under the care of Mr. Heath, May 6, 1878. The swelling of the gums began around the temporary molars two years previously, and gradually spread along the whole jaw. The lower gum was also affected. The child was the subject of fits, probably epileptic. The alveolar borders and hypertrophied gums of both jaws were removed by two operations. (Heath, 'Injuries and Diseases of the Jaws,' 1894, p. 229.) 7776

1356. A mass of hypertrophied gum removed by operation.

From a woman, aged 65.

SIMPLE TUMOURS OF THE JAWS AND GUMS.

Fibrous Tumours of the Jaws and Gums.

1. Fibrous epulis is a fibroma growing from the periosteum of the alveolar border (1357) or from the dental periosteum (1364). In the latter case, if the tooth be extracted, the tumour comes away with it (1364).

2. Fibrous tumours of the body of the upper jaw are met with almost exclusively in the antrum and originate in the periosteum lining that cavity. By their continued growth such tumours may cause absorption of the bony wall of the antrum and encroach upon the cavities of the orbit, nose, and mouth, and project externally beneath the cheek. Fibrous tumours commencing in the alveolus may invade the cavity of the antrum or merely displace its walls.

3. Fibrous tumours of the lower jaw may be central or peripheral. The central tumours expand the jaw and eventually extend beyond the limit of the bony shell in which they are at first contained (1366). The peripheral tumours may more or less completely surround the jaw.

From a consideration of the specimens it will be seen that no sharp distinction can be made between the fibrous tumours limited to the alveolar border (fibrous epulis) and many of the larger tumours which involve the body of the jaw.

1357. A portion of the alveolar process of a lower jaw, with the corresponding part of the gum and one of the canine teeth. From the upper aspect of the gum there has grown a small fibrous tumour or epulis, which rises slightly above the summit of the canine tooth and half surrounds it. The growth has a slightly lobulated and wrinkled surface, and is covered by mucous membrane; its base of attachment is slightly constricted. 2705

1358. Part of the alveolar process of a lower jaw horizontally divided. Attached to the back of the gum covering it is an irregularly ovoidal fibrous tumour about 2 cm. in its longer measurement, but arising from the alveolar periosteum by a pedicle scarcely exceeding a third part of this extent. On its upper aspect the growth is deeply wrinkled and concave, on its lower smoothly rounded; it is covered by mucous membrane. The section of the tumour shows it to be composed of intersecting lines of fibrous tissue spread through a softer, greyish, semitransparent basis-substance; its pedicle is continued into the periosteum of the alveolus. 531

1359. An epulis of very irregular form, and about 5 cm. in its longest measurement. As displayed by the section, it is formed by a semitransparent greyish substance, in which a dense fibroid tissue is freely distributed. A carious tooth remains attached to one part of the growth by the periosteum covering its fang. 1751

Microscopic Structure.—The tumour consists of a delicate network of fibrous tissue, with a few spicules of bone.

1360. A large, lobulated, fibrous tumour, together with part of the right upper alveolar border, including the second bicuspid and first molar teeth and the fangs of the first bicuspid and second molar. The part of the tumour which is directly attached to the outer aspect of the alveolus measures 3 cm. from before back. It rises nearly to the level of the crowns of the teeth, and extends between the second bicuspid and first molar teeth. The main part of the tumour, which forms a lobulated oval mass, 6 cm. in its greatest diameter, is attached to the smaller part of the growth only by a short, slender, fibrous pedicle. On the inner and flatter surface of this part of the growth are several sharply defined shallow ulcers, the largest measuring 2·5 cm. in diameter.

Microscopic Structure.—The tumour consists of a close network of bundles of fibrous tissue, containing small round and oval cells. A few spicules of bone are imbedded in the growth.

Sarah Lambert, aged 24; admitted May 16, 1866. Seven years before she noticed a red pimple about as big as a pin's head in the gum close to the first right upper molar tooth. From that time it gradually increased in size, but remained painless. Present state:—The patient has a tumour on the right side of the face as large as a cricket-ball; it hangs down over the lower jaw as far as the lower border of the bone, and extends upwards to one inch below the margin of the orbit. Laterally it extends from the posterior margin of the ramus to the angle of the mouth. The skin is freely movable over the tumour, and natural in colour. The finger in the mouth passes around the growth everywhere except at one point where it is attached to the gum. The tumour does not project into the mouth between the teeth. The upper teeth are slightly irregular in line from pressure. All the lower molars and the last upper molar are wanting.

The tumour was removed by Sir J. Erichsen. The cheek was laid open for two inches, so as to expose the growth fully. The teeth on each side of its attachment were extracted and the tumour removed with bone-forceps.

1361. A carious incisor tooth, to the dental periosteum of which is attached an oval fibrous tumour 1·5 cm. in diameter. 7266

1362. Three fibrous tumours of the alveolus, removed from different patients. The upper specimen has no tooth attached to it. In the middle specimen the tumour has grown from the dental periosteum of a molar tooth. In the lowest specimen the fangs of two teeth are embedded. 5561

1363. A plaster cast of the lower alveolar arch of the case from which the upper of the above three tumours was removed. The growth forms an irregularly rounded swelling in the position of the first molar tooth of the right side. It projects on both aspects of the jaw and rises above the level of the crowns of the teeth. 5561

1364. A lower molar tooth, with a rounded fibrous tumour nearly 2 cm. in diameter, fixed by a short narrow base to the dental periosteum. 5420

The tumour was removed by the extraction of the tooth, without any further operation.

1365. A portrait in oils of a case of fibrous tumour of the left upper jaw.

The tumour is preserved in the R. C. S. Museum.

The patient, aged 21, was under the care of Mr. Liston. The growth first appeared on the outer side of the gum of the left upper jaw. It was excised 6 months later, but recurred, and 18 months later was again removed with a portion of the alveolar process. In a few weeks it again recurred, and four years after its first appearance the whole of the left upper jaw was removed. (See Liston, 'Medico-Chirurgical Transactions,' vol. xx., and Heath, 'Injuries and Diseases of the Jaws,' 1894, p. 260.)

1366. The right half of a lower jaw, within which a large fibrous tumour has grown. The ramus of the jaw is expanded into a thin osseous shell over a pyriform mass of the growth, near the highest and back part of which the condyle projects almost unaltered; on the inner side of this portion of the tumour, however, the bone is mostly wanting, and also over the much larger elongated mass in front of it, which has grown up for 10 cm. above the lower border of the jaw, and forms a fissured projection reaching forwards as far as the incisor teeth and encroaching upon the cavity of the mouth. On the inner aspect a section has been carried through a small elongated lobe which projects from the lower posterior part of the rest of the tumour, and shows it to be composed of tough-looking almost homogeneous tissue. 3593

Microscopic Structure.—The tumour consists of very delicate fibrous tissue containing small branched cells.

The parts shown were successfully removed by Mr. Liston from a man, thirty years of age, in whom the disease had been observed for about two years and a half. On the patient's admission to the hospital the tumour extended over the whole of the right half of the lower jaw, involving the angle, ramus, and body of the bone; it extended considerably upwards and backwards, encroaching on the soft palate and rendering deglutition difficult. Its growth had not been accompanied with much pain. During the healing of the wound repeated hæmorrhages took place. The patient left the hospital about two months after the operation.

1367. A globular fibrous tumour of the lower jaw, measuring about 7 cm. in diameter. On the upper aspect of the tumour are seen two teeth and part of the mucous membrane of the gum, which has been spread out over the growth. The tumour is seated in the interior of the jaw and at almost all parts a thin layer of the expanded bone can be traced over its surface. The section of the tumour displays a dense structure with intersecting bands of white fibrous tissue, amongst which are small areas of a yellowish-brown colour. 5435

Microscopic Structure.—The tumour consists of fibrous tissue, which in some parts forms dense bundles and in other parts is more loose and more cellular. In circumscribed areas bony trabeculæ are present.

1368. An ovoidal lobulated tumour, 3·5 cm. in its largest diameter. On one aspect the tumour is covered by a very thin layer of bone, to which, however, it only appears to be actually attached in the central part. In the rest of its extent the smooth lobulated surface of the tumour is exposed. The tumour is of firm consistence and its cut surface is almost homogeneous. 8653

Microscopic Structure.—The tumour is a dense richly cellular fibroma, with calcification.

From a woman, aged 20, who was under the care of Mr. Barker in U. C. H. in January 1901. The tumour was painless and of 3 years' duration. It expanded the left side of the jaw chiefly on the outer surface between the middle line and the cleft between the first and second molar teeth; it was easily enucleated after dividing the expanded bone through an incision in the mouth.

CARTILAGINOUS TUMOURS OF THE JAWS.

Enchondroma of the jaws is uncommon. When affecting the upper jaw the tumour gradually expands the bone and may extensively invade the surrounding cavities. In the lower jaw cartilaginous tumours have been met with both of central and subperiosteal origin.

OSSEOUS TUMOURS OF THE JAWS.

Osseous tumours of the upper jaw are usually cancellous in structure and most commonly occupy the cavity of the antrum, but they may grow from the outer aspect of the jaw (1369). The connection of the tumour with the jaw may be slight. Osteoma of the lower jaw may be of the cancellous or of the ivory variety (1370). The exact origin of bony tumours of the jaws is uncertain, but they must be distinguished from chronic inflammatory enlargements due to osteitis and usually caused by the prolonged irritation of carious teeth and sequestra (1353).

1369. The greater part of a right superior maxilla, with the inferior turbinate bone and a prominent, oval, osseous tumour which has grown by a wide base from the anterior wall of the antrum, the parts having been removed by operation. The surface of the tumour is uniformly smooth. The bone has been sawn diagonally across the antrum, which is quite natural in size and appearance; the saw-cut commences about the situation of the second molar tooth, and has been carried upwards and slightly forwards; the nasal process of the maxilla has been also divided with a saw. 3296

The parts were removed by Mr. Liston.

1370. An oval exostosis, 5 cm. long, which was removed from a lower jaw. The greater part of the tumour is of dense ivory-like texture; the rest is closely cancellous. 5406

The tumour was removed from a patient under Mr. Heath's care, May 1870.

"In May 1870 I removed an ivory exostosis from a young woman, aged 32, a patient of Mr. Ceely, of Aylesbury. There had been a painless enlargement of the left side of the lower jaw for five years, and there was also a smaller enlargement of the right side. A small exostosis also existed on the left pubis. I made an incision behind the jaw, and sawed off the growth level to the bone, removing a dense ivory growth measuring two inches in length, one inch in width, and three eighths of an inch thick in the centre. The exterior of the growth presented a finely reticulated appearance, and at the upper part was a small depression filled with cartilage in the recent state." There was no recurrence, and the other growths remained *in statu quo* in March 1878. (Heath, 'Injuries and Diseases of the Jaws,' 1894, p. 327.)

ODONTOMA.

An odontoma is a tumour composed of one or more of the dental tissues (enamel, dentine, cement). The two most important varieties of odontoma are the composite and the radicular. A composite odontoma is a tumour composed of enamel, dentine, and cement (1371); a radicular odontoma arises after the formation of the crown of the tooth is complete and contains no enamel. The term odontoma is sometimes used in a wider sense, so as to include the various cystic and fibrous tumours, which are believed to arise in connection with the development of the teeth.

1371. Half a composite odontoma, the sawn surface having been polished. "The whole surface of the odontoma is nodulated and roughened by stalactitic excrescences, and there is at no point any form recalling the character of a tooth-crown. The surface of the section presents a complicated marbled pattern, due to the admixture of several dental tissues." In its largest diameter the tumour measures nearly 4 cm. 5843

Microscopic Structure.—The tumour consists of dentine, osteo-dentine, and enamel.

From a woman, aged 18, who came under the care of Mr. Heath in 1881 on account of a considerable swelling of the right side of the lower jaw, which was believed to be due partly to a central tumour and partly to inflammation resulting from previous treatment. In two months the inflammatory swelling had subsided, but there was still considerable enlargement of the lower jaw, with a sinus opening externally. The tumour could be seen from the mouth partly covered with granulations, and was at first thought to be a sequestrum. It was removed with an elevator. (Heath, 'Injuries and Diseases of the Jaws,' 1894, p. 218.)

1372. A molar tooth, upon the neck of which, and separated by a considerable interval from the enamel of the crown, is a rounded boss of enamel about the size of a millet-seed. 2660

ANGIOMA OF THE JAWS AND GUMS.

Nævi are occasionally met with in the gums, sometimes in association with a similar affection of other parts of the mucous membrane of the mouth. No. 1373 is a specimen of cavernous angioma of the upper jaw.

1373. A large tumour of the left pterygo-maxillary fossa, removed with the upper jaw. The specimen includes the whole of the maxilla, except a narrow strip of its palatine process and small portions of the nasal and malar processes, together with the whole of the lower part of the palate-bone, and the lower portions of both pterygoid plates of the sphenoid and the inferior turbinated bone. A piece of whalebone has been passed beneath the infraorbital nerve as it lies in the canal in the floor of the orbit.

The tumour, which measures about 8 cm. in the antero-posterior direction, has grown from the posterior surface of the maxilla and filled the spheno-maxillary and lower part of the temporal fossæ, and has passed far backwards under cover of the ramus of the inferior maxilla so as on the inner side to have projected within the pharynx; and from the anterior part of the tumour a portion has grown forwards beneath the hard palate into the mouth. The posterior half of the tumour is deeply cleft into lobes. On the inner aspect of the parts a piece of the tumour has been cut away; the divided surface has a uniformly open, cavernous structure, the meshes of which are nowhere occupied by a solid substance, and probably allowed of the circulation of blood through them. The tumour is everywhere bounded by a dense layer of fibrous tissue. The cavity of the antrum is entirely unaffected. 3287

Microscopic Structure.—The tumour consists of cavernous tissue, the spaces being surrounded by a large amount of dense fibrous tissue.

The parts shown were successfully removed from a man, 21 years of age. The tumour was three years and a half in progress, first appearing as a projection into the pharynx and posterior nares. Frequent and at times severe hæmorrhages took place from it (as much as two or three pints at a time); its growth was attended with little pain. Portions of the tumour were ligatured on three occasions; the entire mass, with the upper maxilla, was finally removed by Mr. Liston. The patient recovered rapidly from the operation. He died three months afterwards from erysipelas of the head and face. (For a report of the case see *Lancet*, vol. i. 1841–42, p. 67; and on the structure of the tumour see *Lancet*, vol. ii. 1844, p. 123.)

1374. The bones of the face and part of the skull from the preceding case. The sawn surface of the malar bone is smoothly healed, and a layer of porous osseous substance has been formed on the other sawn and broken surfaces, as well as on the bone around them. The specimen shows the pterygoid processes of the sphenoid bone to have been removed with the parts preserved in the preceding specimen. 3128

Papilloma of the Gums.

Simple papilloma of the gums is rare ; it must not be confounded with squamous carcinoma, which in the early stages may appear as a small warty growth.

Simple Cysts of the Jaws.

1. *Dental cysts.*—This name is applied to simple cysts, more common in the upper jaw than the lower, which do not contain any part of a tooth in their interior. The cyst may or may not be connected with the periosteum of the fang of a tooth, and may or may not have an epithelial lining. The origin of dental cysts is not certain; possibly in some instances they are inflammatory in origin, and in others arise from remnants of the dental epithelium.

2. *Dentigerous cysts.*—These are characterized by the presence in their interior of one or more teeth or rudimentary teeth. The teeth found in such cysts may be unerupted teeth of the normal series, usually of the permanent set, or they may be supernumerary. Dentigerous cysts have an epithelial lining ; they are more common in the lower than the upper jaw.

3. *Cysts of the Antrum.*—Cysts taking origin in connection with the upper teeth may by their growth occupy the cavity of the antrum. Cysts may also form in connection with the lining membrane of the antrum and may completely fill the cavity, expanding its walls and simulating a collection of free fluid within it.

MALIGNANT TUMOURS OF THE JAWS AND GUMS.

Sarcoma of the Jaws.

Sarcoma of the Upper Jaw most commonly begins within the cavity of the antrum, and by its continued growth may invade the surrounding cavities of the orbit, nose, and mouth. Spindle-cell and round-cell sarcoma are both met with, the latter being, as a rule, the more rapid in its growth. Ossification or chondrification is not uncommon, especially in the spindle-cell variety (1375).

Myeloid sarcoma begins in the alveolar border, expanding the bone and sometimes protruding as a swelling of the gums ; it is much less common in the upper than the lower jaw.

Sarcoma of the Lower Jaw.—This may occur as a central tumour expanding the bone (1384) or as a subperiosteal growth (1387).

Myeloid sarcoma is the most common variety of the central form, and, as in the case of the disease in other parts, is of low malignancy. At an early stage the tumour may protrude into the mouth as a soft dark reddish growth, and at the same time cause increasing expansion of the corresponding part of the body of the jaw (1379).

The other varieties of sarcoma of the lower jaw, spindle-cell and round-cell, are much more commonly met with as subperiosteal than central growths. They are very malignant, and may involve and protrude through the overlying soft parts. As in the case of the upper jaw, ossification and chondrification are common in these tumours.

1375. A left upper jaw, which is the seat of an extensively ossified sarcoma. The growth has probably originated in the cavity of the antrum ; it projects on the facial and zygomatic surfaces as a large lobulated mass and has encroached upon the cavities of the orbit, nose, and mouth. Behind the level of the first molar tooth the alveolar border is entirely obscured by the growth. From the inner surface a part of the growth, which projected into the nasal cavity, has been removed, the sawn surface presenting a finely granular appearance and a consistence of bony hardness. The lower part of this portion of the tumour extends through the hard palate into the mouth. 6221

Microscopic Structure.—The growth consists of round and spindle cells lying in a homogeneous or fibrous matrix in which are spicules of bone.

From a woman, aged 36, who was under the care of Mr. Heath in U. C. H. in 1886. The symptoms dated from 12 months before admission and began with pain in the last upper molar tooth of the left side. Five months later the jaw began to enlarge, with pain in the nostril and ear and headache, and ulceration occurred in the palate. The jaw was removed successfully on June 16, 1886. (Surg. Reg. Rep. 1886, p. 126, No. 1155.)

1376. The greater part of the two upper jaws removed by operation for an ossifying sarcoma, by which the bones have been extensively destroyed. The growth is most extensive on the right side, where it forms a large mass which extends upwards into the orbit and completely blocks the right nasal fossa. On the left side the growth fills the antrum and has completely destroyed the wall of the cavity. The alveolar border is greatly expanded by the growth, and three of the incisor teeth which alone remain are widely separated and loosened. The roof of the mouth is flattened by the growth, and depressed to the level of the alveolar border. The tumour is of firm consistence and its cut surface slightly gritty. 7420

Microscopic Structure.—The tumour is composed of large groups of small round and oval cells lying in a cellular fibrous stroma. In the centre of some of the groups of cells are small areas of ossification.

From a man, aged 51, who was under the care of Mr. Heath in U. C. H. in 1895. The swelling was first noticed 9 months before admission on the right side of the roof of the mouth and was associated with toothache. Death occurred from recurrence about 12 months after the operation. (Surg. Reg. Rep. 1895, p. 82, No. 2270.)

1377. Wax model of the face of an old man, showing the appearances due to the presence of a malignant tumour, probably beginning in the left upper jaw and invading the nasal cavity. 4857

1378. Plaster cast of the face, showing the deformity resulting from the growth of a malignant tumour of the right upper jaw.

1379. The left ramus of a lower jaw, with an adjoining part of the body, 5 cm. in length. Immediately in front of the ramus the body of the jaw, with the exception of its lower border, is expanded by the growth of a myeloid sarcoma which has protruded above through the alveolar process so as to form a second superficially lobulated and somewhat flattened mass, covered with mucous membrane, and overhanging that part of the growth which is enclosed by the bone. 2680

The parts were removed by Mr. Liston.

1380. The body of a lower jaw, from the first molar tooth on each side inclusive, within which a myeloid sarcoma has grown. The tumour has expanded the compact wall of the bone into a thin shell, and forms a slightly lobed swelling limited laterally by the second bicuspid teeth, and extending slightly beyond the proper line of the jaw below; the chief projection of the tumour is upwards, in which direction it rises considerably above the normal level of the alveolar border. In its growth it has displaced the alveolar portion of the jaw, with the teeth, upwards; by the absorption of the osseous tissue the teeth have come in places to lie imbedded in the depth of the tumour. The upper part of the growth, where it has projected within the mouth, is covered by mucous membrane; the posterior part has been cut away to display its characters. The soft-looking, pale grey mass composing the tumour is supported by an areolar framework, and imperfectly parted into lobes by thick fibrous trabeculæ. The cell-elements consist of large round and myeloid or giant cells. 3694

There is no history of the tumour, which was removed from a private patient by Mr. Liston.

1381. The part of the right half of a lower jaw behind the canine tooth. The ramus and body of the jaw, as far forwards as the second bicuspid tooth, have been expanded by the growth of a tumour between their tables; the inner surface of the body and posterior border of the ramus are unaltered in form; the chief deformity of the body has occurred outwardly. The surface of the swollen part is somewhat lobular; over the upper and posterior half of the outer part of the swelling the osseous shell is absent, the tumour being, in these situations, bounded by a layer of fibrous tissue, formed apparently by the periosteum. In the situation of the coronoid process, which has been widely expanded in every direction, the substance of the tumour has been exposed by the removal of the bony shell which covered it; the growth is composed of a soft, pale yellow substance. 3288

Microscopic Structure.—The tumour is a sarcoma composed of small cells, mostly round or oval in shape.

From a female, 20 years of age, who suffered many years from toothache, the enlargement of the jaw having commenced three years before the operation and after the removal of a decayed tooth. The parts shown were removed by Mr. Liston, and the patient perfectly recovered. (For a report of the case see *Lancet*, vol. i. 1839–40, p. 244.)

1382. The anterior part of a lower jaw, together with a tumour occupying its concavity. On the right side the bone has been sawn 1·5 cm., and on the left side 3 cm., behind the mental foramen. All the teeth are absent, with the exception of the right canine and the fang of the first bicuspid. The tumour, which presents on its surface small prominent lobules and measures vertically 5·5 cm., is attached to the posterior aspect of the alveolar border of the jaw for a distance of about 3 cm. to the left of the symphysis, and immediately to the left of the middle line the attachment to the posterior surface of the bone extends downwards as far as its lower border. The cut surface of the tumour presents an ill-defined fibrous structure. 3595

Microscopic Structure.—The tumour is a small spindle-cell sarcoma.

The tumour and part of the jaw shown were removed by Mr. Liston from a woman, 45 years of age, in whom the tumour was first noticed after an attack of influenza, about two years previously. The tumour filled the hollow behind the body of the lower jaw, and was attached to the body of the jaw near the symphysis, forming a swelling under the chin, and pushing the tongue into the back of the mouth; its surface was irregular and nodulated, and its consistence hard. Before the patient's admission to the hospital parts of the tumour had been destroyed by the application of nitric acid and other caustics.

1383. The right half of a lower jaw, on the body of which a long oval tumour has grown. The growth projects chiefly on the outer side, and its most prominent part has protruded through the skin, forming an overhanging projection which has an open reticular surface. On the inner side the tumour has invaded the jaw, in places destroying its entire thickness; the growth, however, scarcely projects into the cavity of the mouth. As seen on the divided surface it is composed of a soft, granular, yellowish basis, divided into small polyhedral masses by narrow lines of fibrous tissue; its limit is everywhere definable. 2626

Microscopic Structure.—The tumour is a large round-cell sarcoma.

The parts were successfully removed from a woman, 60 years of age. The patient was under the care of Mr. Liston.

1384. Part of the right side of the body of a lower jaw, removed by vertical division in front of the first bicuspid tooth and behind the last molar. Projecting from the outer aspect of the bone is an irregularly oval tumour measuring nearly 5 cm. in its antero-posterior diameter. The tumour is continued over the alveolar border in the position of the first molar tooth, which is wanting; it was confined to the cavity of the mouth, and the mucous membrane reflected from the outer surface of the jaw to the cheek has been divided along its lower border. The whole of the piece of the jaw preserved is enlarged, and a section through the bone and tumour shows that the greatest thickness of the jaw is nearly 3 cm. The interior of the expanded jaw is occupied by soft growth continuous with that forming the external tumour, the appearance suggesting that the growth was of central origin and has subsequently protruded from the alveolar border. The cut surface of the tumour is brain-like and studded with small cysts. 5431

Microscopic Structure.—The tumour is a sarcoma composed of small round- oval- and spindle cells lying in a finely reticulate stroma. The cysts visible to the naked eye appear to have resulted from degenerative changes.

1385. Part of the left side of the body of a lower jaw, removed by division of the bone in the middle line and 2·5 cm. behind the mental foramen. Only the two incisor and canine teeth remain, and the inner aspect of the alveolar border in nearly the whole length of the specimen is occupied by a tumour which does not rise above the level of the gum, and extends downwards on the inner aspect of the bone in nearly its upper half. The growth is surrounded by the divided edge of mucous membrane and the superficial surface is slightly irregular. 6392

Microscopic Structure.—The tumour is a small round-cell sarcoma.

1386. The left half of the lower jaw of a child, removed by operation. The jaw is the seat of a tumour which forms a considerable swelling on its outer aspect from the canine tooth to the coronoid process. The upper border of the tumour rises above the level of the molar teeth, which are displaced inwards. Below, the growth extends around the lower border of the jaw and forms a much less extensive swelling on its inner aspect. There is no evidence of expansion of the bone, and the tumour almost certainly originated beneath the periosteum. The cut surface of the tumour is homogeneous. 7311

Microscopic Structure.—The tumour is a small round-cell sarcoma.

Removed by Mr. Heath from a boy aged about 8 years. Local recurrence occurred and ended fatally in a few months.

1387. The right half of a lower jaw, removed by operation for a large sarcoma growing from the region of the angle. Externally the tumour forms an oval mass about 7 cm. in its longest diameter, projecting from the bone about 2·5 cm. It extends forwards on the lower border of the jaw to the level of the second bicuspid tooth, and upwards on the outer aspect of the ramus to within 2 cm. of the sigmoid notch. The parotid gland is incorporated with the posterior border of the tumour, and a section through the upper part of the growth shows that the masseter muscle is extensively infiltrated. The growth extends upwards on the inner aspect of the jaw as high as the mylohyoid ridge. The cut surface of the tumour is imperfectly divided into lobules by strands of white fibrous tissue. The growth is intimately adherent to the jaw and doubtless originated beneath the periosteum. 8594

Microscopic Structure.—The tumour consists of small round cells in a fine fibrillated network.

From a man, aged 61, in whom a small hard swelling below the lower jaw on the right side had been noticed for 13 months. On admission there was a large tumour of the right side of the lower jaw reaching upwards to the level of the tragus, backwards to a vertical line through the posterior border of the mastoid process, and downwards to the level of the upper border of the thyroid cartilage. There were two enlarged glands in the neck below the tumour. On the day after admission the right half of the lower jaw was removed together with the enlarged glands. Death occurred from shock one hour after the operation. (Surg. Reg. Rep. 1890, p. 55, No. 1500.)

1387 A. A wax model of a great spindle-celled sarcomatous tumour, which in its growth destroyed the entire body of the lower jaw. The tumour is of an irregularly oval shape, its long axis corresponding with the long axis of the jaw. Antero-posteriorly it measures 20 cm., and from side to side about 11 cm.; its surface shows but little sign of lobulation; the condyloid part and upper half of the ramus of the jaw are unaffected. The tumour projects almost twice as far below the proper level of the jaw as above it. On its outer aspect it exhibits a partial division into two parts. The upper and smaller of these two parts, in which many of the teeth lie widely separated, occupied the cavity of the mouth; the lower portion of the growth, distinguished from the rest by its deep ochre-yellow and orange-red colour, and by the hæmorrhages apparent upon it and the pus spread in places over it, protruded through the skin; the borders of this part slightly overlap the portion of the tumour behind. On the right side, near the angle of the jaw and at the most posterior part of the growth, is a second surface 4 cm. in diameter, similar to that just described, and which corresponded with the seat of a second protrusion of the tumour. 5280

The tumour was removed by Mr. Heath, Nov. 20, 1867; the specimen itself is in the Museum of the Royal College of Surgeons. The patient was a man 32 years of age; family and personal history good. Eleven years before he had severe pain in the right jaw resembling toothache, and shortly afterwards he noticed a small hard swelling about the size of a nut just below the right canine-tooth, which was not decayed, nor were the other teeth in the neighbourhood affected. The tumour remained of the same size and free from pain for five or six years; it then enlarged, and two years later he injured the part and profuse hæmorrhage ensued from the gums. The tumour grew rapidly, spreading along the anterior part and invading the whole of the right side of the jaw. It was treated by quacks, who destroyed the skin over the part by local applications. On admission to the hospital the patient's mouth and the whole of the lower part of the face were occupied by the tumour; the measurements of the latter were as follows:—from ear to ear under the chin 19½ inches; from the lower lip to pomum Adami 13 inches; from the angle of the jaw on one side to that on the other 14 inches. When the man was sitting the tumour rested upon the top of the sternum, but moved freely upon his opening the mouth. Between the lips (the lower of which was much stretched) was a red granulating mass of the disease, which touched the upper lip; when the mouth was open a space intervened through which a second mass, covered with the mucous membrane of the mouth, could be seen, almost in contact with the roof of the cavity and completely hiding the tongue. An inch below the lower lip was a large red fungous mass covered with healthy granulations extending to the lower border of the tumour; on the right side below the angle of the jaw was a smaller fungous protrusion. The disease was entirely confined to the lower jaw and the tissues in immediate contact with it; the cervical lymphatic glands were unaffected. The entire mass, including the whole of the lower jaw except a small portion of the ramus and the condyle on the left side, was removed with very little loss of blood. The patient did well for a few days, but died from exhaustion on the morning of the sixth day. After death the viscera were found to be healthy; no pyæmic deposits. The tumour weighed 4 lb. 6 ozs. The disease extended from the junction of the body with the ramus of the left side to halfway up the ramus of the right side.—See *Lancet*, vol. ii. Dec. 21, 1867, p. 765.

Microscopically the tumour consisted of a fine stroma, varying much in its degree of fibrillation from a dimly granular matrix to a distinctly fibrous structure; in this stroma were imbedded a large number of elongated, oval, fusiform cells, each containing one large oval nucleus and a nucleolus. For further particulars see a Report by A. Bruce, Esq., in the 'Transactions of the Pathological Society,' 1868.

1387 B. Three photographs of the patient from whom the preceding tumour was removed.

CARCINOMA OF THE JAWS AND GUMS.

Carcinoma of the jaws always originates, as elsewhere, in an epithelial structure, the osseous tissue being only invaded secondarily.

Carcinoma of the upper jaw may begin externally in the mucous membrane of the palate or gum (1388), or internally in the lining of the antrum (1389). The upper jaw may also be invaded by carcinoma originating in its neighbourhood, as, for instance, in the nasal cavity. The antrum is more often involved secondarily by growths beginning in the palate or gum than primarily. From the antrum the disease may gradually invade the nasal cavity, the orbit, and the pterygo-maxillary space. Carcinoma of the palate or gum is of the squamous-cell variety, that originating in the antrum may be of the columnar-cell or spheroidal-cell form.

Carcinoma of the lower jaw is represented chiefly by squamous carcinoma of the gum, which, by its continued growth, may more or less extensively destroy the osseous tissue (1394). The jaw may also be invaded by a similar growth beginning in the lip (1396), tongue, or floor of the mouth (1399).

A peculiar form of carcinoma originating in the substance of the lower jaw constitutes the affection commonly known as *multilocular cystic disease*. It consists of a varying admixture of solid growth and cystic spaces (1400), and presents microscopically the essential features of an infiltrating epithelial growth (1405). The growth may cause considerable expansion of the body and ramus of the jaw, and has the clinical features of a tumour of low malignancy. These tumours are believed to arise from epithelial inclusions in the jaw associated with the development of the teeth.

1388. The lower part of a left upper jaw, removed by operation for a squamous carcinoma of the alveolar border. The growth extends from the first bicuspid to the third molar tooth, the intervening teeth being wanting. The surface of the growth is deeply excavated in the line of the teeth, but internal to this it is raised and coarsely warty. The growth extends on the surface of the hard palate nearly to the saw-cut in the middle line. The growth is surrounded by the raised mucous membrane of the gum, and the border which encroaches on the palate is overhanging. 6244

From a man, aged 51, who was under Mr. Heath's care in 1886. The growth had commenced 7 weeks previously as a "gumboil," and had gradually increased in size. The part of the jaw preserved was removed after division of the upper lip. During the operation laryngotomy became necessary for the removal of blood from the air-passages. Death occurred on the 7th day from lobular pneumonia. (Surg. Reg. Rep. 1886, p. 43, No. 1911.)

1389. A left upper jaw, excepting the orbital plate, removed for carcinoma of the antrum. The tumour fills the cavity of the antrum, the walls of which are extensively destroyed. The tumour causes a considerable bulging of the palate, the mucous membrane covering which shows commencing ulceration. The alveolar border is destroyed behind the first bicuspid tooth, and the growth in this situation is extensively ulcerated. The extension of the growth through the palate is continuous with the growth in the nasal cavity. 5509

Microscopic Structure.—The tumour consists of epithelium-lined spaces lying in a delicate cellular stroma. The spaces vary much in size and shape; some are small and round, others are convoluted, and others tubular. The lining epithelium consists of many layers of small round cells, and in nearly all the spaces encloses a lumen. In some of the spaces the epithelium projects into the lumen, and in some completely fills it. The growth probably originated in the glands of the mucous membrane of the antrum.

1390. A left upper jaw extensively destroyed by a carcinoma, which probably originated in the gum. All the teeth behind the canine are wanting, and in the position of the bicuspid teeth the alveolar border is occupied by a pedunculated, coarsely lobulated projection of the growth; farther back in the alveolar border the tumour forms a small, smooth, conical projection beneath the mucous membrane. The cavity of the antrum is occupied by ragged new growth, and all its walls have been extensively destroyed. 6799 A

Microscopic Structure.—The tumour is a squamous carcinoma, and consists of large masses of polyhedral cells lying in a scanty stroma.

From a man, aged 50, who was admitted into U. C. H., under the care of Mr. Heath, Dec. 7, 1891. In August 1891 the lower canaliculus of the left side had been slit up on account of epiphora. A tumour in the mouth had been detected for 2 or 3 weeks. On admission there was fulness of the cheek and œdema of the eyelids of the left side. Behind the canine tooth the left upper alveolar border was occupied by a fungating growth; there was a soft swelling beneath the mucous membrane of the left half of the palate, the left nostril was blocked, and a soft growth projected back through the posterior nares. On Dec. 9 the left upper jaw was removed by Liston's method, laryngotomy being performed during the operation. When discharged, in Jan. 12, 1892, patient's general condition was good, and the laryngotomy wound had healed. (Mr. Heath's *Case-books*, 1892, vol. i. p. 280.)

1391. A left upper jaw extensively infiltrated by carcinoma, which has so completely destroyed the osseous tissue that the only recognisable part of the bone is the nasal process. The growth forms a solid mass, and fills the cavity of the antrum. All the teeth are absent, and by the extension of the growth the palate and alveolar border form one flat surface covered with mucous membrane, which presents at its inner part a coarse velvety appearance. The tumour also forms a uniform bulging of the facial and zygomatic aspects of the jaw, and projects inwards so as to cause obstruction of the left nasal cavity. The tumour on section presents a coarsely granular structure and numerous minute cysts. 6903

Microscopic Structure.—The tumour is a squamous carcinoma.

From a woman, aged 50, who was admitted into U. C. H., under the care of Mr. Heath, Sept. 12, 1892. Four months previously there was pain in the left side of the face, followed a week later by swelling of the cheek. A month later an abscess in the mouth was opened, with temporary relief of the pain. On admission there was bulging of the left cheek and left side of the nose, the skin being œdematous; floor of the left orbit bulged; the left nostril was blocked by a firm reddish mass; the left superior alveolar border was enlarged and the hard palate bulging; there was an enlarged gland in the left submaxillary region, and smaller ones on both sides of the neck. On Sept. 14 the left upper jaw was excised by Liston's method, laryngotomy being performed during the operation. The patient was discharged on Oct. 9, and on Nov. 4 there was recurrence in the mouth. (Mr. Heath's *Case-books*, 1892, vol. i. p. 347.)

1392. The anterior part of a left upper jaw which has been extensively invaded by a tumour. On the alveolar border and hard palate the growth has an irregularly lobulated or, in parts, warty surface; this part of the growth is directly continuous with that which fills the portion of the antrum preserved in the specimen, and which projects through the anterior wall of the antrum so as to form a large rounded projection on the facial aspect of the bone. The cut surface of the tumour has a distinctly foliated appearance, and is intersected by fine bands of fibrous tissue.

Microscopic Structure.—The tumour is a squamous carcinoma, the cells of which show in parts distinct horny change. The growth probably originated in the mucous membrane of the gums or palate.

1393. The base of a skull, with portions of the facial bones, in which extensive destruction has been caused by malignant disease, which originated in the left antrum. The left superior maxilla and malar bone, with considerable parts of the right maxilla, among the facial bones, and the pterygoid processes of the sphenoid on the left side, and almost the whole of the ethmoid and the lower part of the frontal bone among the bones of the cranium, have disappeared before the extension of the disease. The floor of the frontal sinus is wholly wanting on the left side; and by the destruction of the cribriform plate of the ethmoid a considerable opening exists in the cranial cavity. The portions of the bones affected have an open coarsely reticular surface, showing them to have been infiltrated by the growth. 3252

1394. Part of the right side of the body and alveolar border of a lower jaw, removed by operation for a squamous carcinoma of the gum. The growth presents a coarsely papillary surface, and measures 4 cm. from before back, and 2·5 cm. in breadth. It is entirely limited to the alveolar border, and all the corresponding teeth are wanting. 7240

Microscopic Structure.—The tumour is a squamous carcinoma.

From a man, aged 48, who was admitted into U. C. H., under the care of Mr. Heath, on April 1, 1894, complaining of soreness of the tongue and right side of the mouth of three months' duration. The mucous membrane on the inner aspect of the right lower alveolus was irregularly thickened, and there was induration and ulceration at the posterior part of the left half of the tongue. Iodide of potassium was given and the jaw scraped, with some improvement. In June the growth in the alveolus had assumed the characters of a squamous carcinoma, and the part of the jaw preserved in the specimen was excised. Three weeks later the left half of the tongue was removed with scissors; the growth at the posterior part was a squamous carcinoma. Rapid recurrence of the growth in the jaw took place. (Mr. Heath's *Case-books*, 1894, vol. iii. pp. 284, 348.)

1395. Part of a lower jaw removed by sawing the bone vertically on the right side between the socket of the lateral incisor and canine teeth, and on the left side nearly horizontally, through the lower part of the ramus. In the incisor region of the jaw the alveolar border is occupied by a friable ragged growth, which extends in the middle line into the body of the jaw. From the incisor region the growth extends backwards and downwards on the inner aspect of the jaw, so as extensively to involve the sublingual and submaxillary glands of the left side. From the submaxillary gland the growth further extends around the lower border of the jaw between the mental foramen and the angle, and extends upwards on its outer surface to midway between the lower border and alveolar border.

Microscopic Structure.—The growth is a squamous-cell carcinoma.

Removed by Mr. Heath from a man aged 46; the patient recovered from the operation, but the final result is not known.

1396. Part of the left side of a lower jaw removed by vertical division through the middle line and oblique division through the ramus, together with a large tumour surrounding the body of the jaw and involving the submaxillary gland, and an elliptical piece of skin, the central part of which is also implicated. The growth rises on both aspects of the jaw, nearly as high as the alveolar border. 6222

From a man, aged 55, who was under the care of Mr. Heath, in U. C. H., in 1886. A primary carcinoma of the lower lip had been removed 2 years previously, and a year later a swelling was noticed beneath the left angle of the jaw, and rapidly increased in size until it reached the dimensions shown in the specimen. There was no recurrence at the site of the primary growth. The patient was discharged 3 weeks after the operation. The growth involving the jaw probably originated in the lymphatic glands below it. (Surg. Reg. Rep. 1886, p. 44, No. 552.)

1397. Part of a lower jaw, removed by division of the bone on the right side vertically behind the socket of the second bicuspid tooth and on the left side obliquely from behind the third molar tooth to the angle. The jaw is the seat of a tumour, and has been sawn through between the second bicuspid and first molar teeth of the left side, in order to display the relations of the tumour to the bone. The limits of the tumour extend on the lower border of the jaw from a little to the right of the middle line nearly as far as the left angle. Between these limits the tumour forms an irregularly rounded mass below the jaw, rising on the inner surface to within 1 cm. of the alveolar border opposite the first molar tooth and on the outer surface to a corresponding height opposite the last molar tooth. In the section the outline of the jaw is unaltered, except that the lower border is eroded by the growth, which extends into its substance. The tumour is firm in consistence, and the cut surface is freely marked by white fibrous bands. In the posterior part of the tumour on its inner aspect an irregular cystic cavity has been freely opened. 5662

Microscopic Structure.—The growth is a squamous-cell carcinoma. The epithelial columns are scanty and lie in a very abundant fibrous stroma. The epithelium cells show well-marked horny change with the production of cell-nests.

Removed by Mr. Heath from a man aged 60. The growth recurred and the patient died in a few months.

1398. Part of the left side of the body of a lower jaw, removed by division of the bone behind the last molar tooth and in front of the canine. The jaw is the seat of a tumour which involves both aspects of the bone, but more extensively the inner surface, where it forms a considerable swelling which rises as high as the edge of the alveolar border. On the outer aspect the tumour involves only the lower half of the body of the jaw. The lower border of the bone is eroded by the growth. Adherent to the outer surface of the growth, which is very soft and friable, is an elliptical piece of skin. 5625

Microscopic Structure.—The tumour is a squamous-cell carcinoma. Many of the cell-columns present well-marked nests, the central cells of which are swollen and granular and the peripheral cells flattened.

The tumour was removed by Mr. Heath from a patient, aged 45, who had previously had a portion of the jaw removed; recurrence took place and the patient died in about six months.

1399. Part of a lower jaw, the central portion of which had been removed by vertical division of the bone a short distance in front of each mental foramen. The divided surfaces are nearly in apposition, and in their lower part the two fragments are firmly united by bone at an angle of about 70°. 6823

The anterior half of the tongue with the central portion of the lower jaw and the intervening structures of the floor of the mouth had been removed for carcinoma in December 1889 (Surg. Reg. Rep. 1890, p. 166, No. 2680). The patient was readmitted into U. C. H. under the care of Mr. Barker on Jan. 4, 1892, with recurrence in the tongue and floor of the mouth and enlarged glands in the upper part of the left side of the neck. Death occurred under the anæsthetic before the operation was commenced. (Mr. Heath's *Case-books*, 1892, vol. i. p. 277.)

1400. The outer half of a large cystic tumour, which involved the lower jaw. The subcutaneous surface is recognisable by the portion of the masseter adhering to the tumour. On this surface openings have been made into two large cysts, both of which have thick membranous walls and a smooth interior. On the opposite side of the specimen the parts have been divided through a large cyst, from the sides of which there project nodules and lobulated outgrowths of tumour-substance. The cut surface of the solid portions of the tumour and of the intracystic growths, as best seen on the left of the preparation, presents small closely-set spaces of various forms, and filled with a soft granular material, giving to the whole a gland-like structure. The bone has for the most part disappeared before the growth which has invaded it.

Microscopic Structure.—A section of the solid part of the growth presents a scanty fibrous stroma enclosing large spaces occupied by masses of epithelial cells. The peripheral cells present in parts a columnar shape, whilst the remaining cells are either small and branched or spindle-shaped.

From a man, aged 22, who was admitted into U. C. H., on July 10, 1871, under the care of Mr. Heath. Six years previously patient first noticed a small hard swelling on the right side of the lower jaw. The tumour steadily increased in size, and had been lanced and tapped several times in the mouth. On admission the right side of the face presented a large, smooth, globular swelling reaching forwards to the angle of the mouth, backwards to an inch behind the lobule of the ear, upwards to the lower margin of the orbit, and downwards to the level of the hyoid bone. The overlying skin was not involved. On July 12 the tumour was removed by operation together with the affected portion of the jaw. The patient made a quick recovery.

Before section the tumour was almost globular, had a diameter at its widest part of 3½ inches, and was somewhat lobular on the surface; it weighed 13½ ounces. Over the whole of the lower part was a thin shell of expanded bone; for the greater part this was over a solid growth, but at the upper and outer aspect was a large cyst capable of holding about six ounces of fluid. The lower part of the wall of the cyst was bony, but the whole of the upper part was free from bone; all the inner wall of the cyst was invested with a thin osseous layer. Anterior to the large cyst was a smaller one containing about half an ounce of thick fluid in which was a large quantity of cholesterin. Both cysts were lined by a smooth thin membrane. On the inner aspect of the tumour there were two openings, each about three-quarters of an inch in diameter, which had opened into the mouth; they communicated with a large cavity in the centre of the tumour, into which the finger could be passed for nearly three inches. On making a section this inner cavity was found to be about three inches in length; its inner surface was irregularly lobulated, the lobules varying in size from that of a pea to a filbert. The tumour was moderately firm, of a whitish colour, and small points of bone were scattered through its substance.

The other half of the specimen is in the Museum of the Royal College of Surgeons. (*Lancet*, March 23, 1872, p. 397; and Heath, 'Injuries and Diseases of the Jaws,' 1894, p. 200.)

1401. The greater part of a lower jaw removed by operation, the bone having been disarticulated at the temporo-maxillary joint on the right side and sawn through a short distance in front of the angle on the left side. On the right side the condyle, neck, and upper part of the ramus are normal, and on the left side the bone is unaffected for a distance of 1 cm. in front of the sawn surface; but in the rest of the specimen the jaw is occupied by a large cystic tumour. The tumour is most extensive in the right half of the body of the jaw, where it forms a lobulated mass expanding the bone, and projecting from the alveolar border. The smaller lobules consist of solid tumour-substance, but the larger lobules are produced by cysts in the growth, several of which have been laid open. These cysts are partly surrounded by a shell of bone and are lined with a soft membranous layer. The largest cyst, which measures 4 cm. in diameter, projects from the lower border of the body and contains a large mass of brownish coagulated material.

To the left of the middle line the disease is much less extensive and only involves the upper half of the body of the jaw, the lower border of which is unaltered. In this position the expansion is more marked on the outer than on the inner aspect and a very thin layer of bone still covers the growth, on the upper surface of which the sockets of some of the teeth can still be seen. 5850

Microscopic Structure.—Large branching masses of epithelium-cells, the peripheral rows of which are columnar, lie in a scanty cellular stroma. At one place the columns of epithelium-cells are continuous with the epithelium covering the gum.

From a woman, aged 51, who was admitted into U. C. H. in August 1882, under the care of Mr. Heath. At the age of 35 the patient first noticed a lump the size of a pea beneath the tongue on the right side, which gave some pain and for which a tooth was extracted. From that time abscesses formed in the lower jaw, some of which discharged internally and one externally, and several teeth were extracted. At the age of 44 patient was admitted under Mr. Heath's care, and presented considerable expansion of the right side of the lower jaw by a lobulated tumour. The tumour was freely incised within the mouth; a quantity of dark-coloured fluid escaped, the semi-solid contents of the large cystic space were cleared out, and the bony walls of the cavity crushed together. A month after the operation patient was discharged, the cavity in the jaw being nearly closed. In October 1878 there was a recurrence of the cystic growth, which was again treated by gouging and crushing in the thin bony walls of the cavity. In August 1882 extensive recurrence had again taken place, and the parts preserved in the specimen were removed by operation. The patient made a good recovery. (Heath, 'Injuries and Diseases of the Jaws,' 1894, p. 203.)

1402. The greater part of the left side of the body and ramus of a lower jaw, except the neck and condyle. The whole of the ramus and the greater part of the body are expanded by a solid central tumour, the angle and the lower border being the parts least affected. On the outer aspect the most prominent part of the expansion forms an elliptical swelling, measuring 6 cm. by 3·5 cm., over almost the whole surface of which a very thin layer of bone can be felt. On the inner aspect the expansion is less marked and more irregular, the bony shell being, over a considerable part, wanting. In the expanded ramus the central growth is readily separable from the shell of bone. All the corresponding teeth are wanting, and at the anterior part of the inner aspect of the growth, surrounded by lobules of the tumour, is an irregular cavity which opened into the mouth. 6282

Microscopic Structure.—"The growth consisted of a number of tubes lined with one or more layers of cylindrical cells, and separated from one another by a highly refracting matrix composed apparently of closely packed spindle-shaped cells: some of the tubes have a distinct lumen, others are nearly filled by small, round, and ill-formed spindle-shaped cells. In many places the resemblance to the structure of the enamel-organ is marked; the tubes are lined by one or more layers of cylindrical cells, enclosing a tissue composed of spindle-cells and many stellate cells, the branches of which unite with one another; there was nowhere any squamous development of the epithelial cells."

From a man, aged 34, who was admitted into U. C. H., under the care of Mr. Heath, in 1887. He first noticed a lump on the left side of the lower jaw eight years previously; a few weeks later the swelling was lanced and the wound closed. A few months afterwards the swelling increased in size, gathered, and burst into the mouth; since then there had been a discharge from the sinus. The swelling of the lower jaw steadily increased. On admission the left cheek was rendered very prominent by the enlargement of the jaw, which in most parts was hard but in some places soft and elastic. The left half of the jaw was excised in the usual way, but in disarticulating the condyle the neck broke through. The patient left the hospital a month after the operation. (Surg. Reg. Rep. 1887, pp. 38 and 190, No. 178.)

1403. Half a multilocular cystic tumour, which has extensively destroyed the right half of a lower jaw. Anteriorly the growth reaches to the mental foramen and posteriorly involves the whole of the ramus. The growth, which has originated in the interior of the jaw, consists of a number of cystic spaces, the largest of which measures 5 cm. in diameter. At nearly all parts the cysts are surrounded by a thin shell of the expanded bone, and they are separated one from another by septa which are partly bony and partly membranous. The cysts are lined by a smooth membrane which can easily be peeled, as a distinct layer, from the bony wall. Between the most anterior cyst and the large one which lies above and behind it is a layer 2 cm. in thickness, in which the bone is infiltrated by solid new growth. 7238

Microscopic Structure.—A section of an intracystic growth, which was found projecting into one of the cysts, showed a delicate stroma of connective tissue and spindle-cells containing spaces of varying size lined with columnar epithelium.

From a woman, aged 40, who was admitted into U. C. H. in 1894. The tumour was first noticed in the position of an abscess which followed the extraction of a tooth eight years previously. The upper part of the tumour was soft and fluctuating and the lower part formed by the much expanded body of the jaw. The teeth were absent behind the first bicuspid and cysts were visible beneath the mucous membrane. The right half of the jaw was successfully removed by operation. (Surg. Reg. Rep. 1894, p. 44, No. 969.)

1404. Part of a lower jaw, from the first bicuspid tooth on the right side to the second molar on the left inclusive, expanded by the growth of an oval tumour within it. The projection of the tumour is greatest anteriorly, and in this situation the bone is wholly wanting; the lower part of the jaw is unaltered in form. The growth is composed of intersecting fibrous bands, the meshes between which are occupied by cysts of various sizes; the larger cysts are round, and have a smooth interior; the smaller, mutually adapted and variously elongated, are filled with a pale yellow, soft, granular substance. 3619

Microscopic Structure.—The tumour consists of a fibrous stroma enclosing spaces varying much in size and some of them showing epithelial contents, but the condition of the specimen prevents an accurate histological examination.

The patient, who was under the care of Mr. Liston, first noticed a swelling of the jaw about six years previously; the disease progressed much more rapidly during the later period of this time. There had never been ulceration or hæmorrhage from the tumour; mastication and articulation were interfered with. When the patient was admitted the tumour had the following characters:—It was hard, smooth on the surface, like healthy gum, slightly elastic at parts, as if it were situated between the walls of the bone; it extended from the first bicuspid tooth on the right side to the second molar on the left; and the chin was rendered very prominent and round by the growth. In addition to the parts shown, a piece of the jaw on the left side was removed with saw and bone-forceps, owing to a doubt arising whether the whole of the disease was taken away. The wound healed favourably, and the woman was discharged a month after the operation.

1405. The right half of a lower jaw, removed by vertical division of the bone in front of the canine tooth. Excepting the condyle and neck, the jaw has been greatly expanded by the growth of a central tumour, consisting of a firm, slightly spongy, fibrous substance and large cystic spaces, the largest of which occupies the bone in the position of the angle. The expansion of the jaw is much more marked on the outer than the inner aspect, and in the former situation the shell of expanded bone is extremely thin and in some parts wanting, the tumour being enclosed merely by a dense fibrous capsule. By the growth of the tumour the wisdom-tooth has been almost inverted and displaced upwards as far as the neck of the jaw. 3695

Microscopic Structure.—The solid part of the tumour consists of a dense cellular fibrous tissue enclosing spaces filled with epithelium. The peripheral cells are columnar, whilst the remainder of the cell-masses consist of small irregular cells which in the central parts have undergone colloid degeneration. (See Heath, 'Injuries and Diseases of the Jaws,' 1894, p. 317.)

1406. The right half of a lower jaw, except the neck and condyle. Between the lateral incisor tooth and the upper part of the ramus the jaw is expanded into a thin bony shell deficient superiorly, the only part of the alveolar border which remains being that including the lateral incisor, canine, and two bicuspid teeth. The expansion of the jaw is more marked on the outer than the inner aspect, and viewed from within the bony shell is marked by circular ridges and the inferior dental canal can be traced on its outer wall. 2699

The expansion of the jaw was probably caused by a central multilocular cystic tumour.

HYPERTROPHY OF THE NECK AND CONDYLE OF THE LOWER JAW.

Enlargement of the condyle of the lower jaw may result from rheumatoid arthritis, but the extreme hypertrophy shown in No. 1407 is rare and has been met with without any evidence of rheumatoid arthritis in other joints.

1407. A section of the condyle, neck, coronoid process, and part of the ramus of the left side of a lower jaw. The natural size and shape of the condyle and neck are entirely altered, so as to form a mass expanded superiorly and measuring 4 cm. in the antero-posterior diameter. The greatly enlarged articular surface is irregular and in parts apparently covered with fibro-cartilage; the borders of this surface are nodular and obliquely fissured. The section of the hypertrophied condyle and neck displays cancellous bone surrounded by a thin compact layer. 5901

"From a woman, aged 36, whose face had for 10 years become gradually more deformed by the increasing displacement of the chin to the right side and the projection outwards of the left condyloid process. The movements of the jaw were restricted, and the length of the left ascending ramus was 3 inches, of the right 1½ inch. She had an attack of hemiplegia, implicating the left side of the face, when she was 25 years of age, and from this affection her limbs had recovered perfectly and her face partially." The part of the jaw preserved in the specimen was removed by operation with a very satisfactory result, the face being brought straight and the patient having free movement of the jaw. (Heath, 'Injuries and Diseases of the Jaws,' 1894, p. 382, and Trans. Path. Soc. vol. xxxiv. 1883, p. 185.)

DISEASES OF THE TEETH.

ABNORMALITIES IN THE NUMBER, FORM, POSITION, AND STRUCTURE OF THE TEETH.

This series of specimens was presented by Mr. Sidney Spokes.

Number.—If less than thirty-two permanent teeth erupt, the missing teeth are usually either third molars or lateral incisors, and in some mouths these teeth when erupted are only rudimentary.

Supernumerary teeth are not uncommon, and may resemble the normal teeth in appearance (supplemental teeth) (1408) or present a conical or irregular shape (1414).

Form and Size.—The size may be excessive (1420) or may be below the normal (1424). The form may be variously modified, as by undue elevation of the cingulum (1425).

Position.—The departures from the normal arrangement of the teeth are: (*a*) general crowding, due to a want of proportion between the size of the teeth and the size of the jaws or resulting from the presence of supernumerary teeth (1417) or retained temporary teeth (1432); (*b*) superior protrusion, in which the upper front teeth protrude so as sometimes to rest upon the lower lip (1433); (*c*) inferior protrusion or underhung bite, in which the lower teeth protrude (1436); (*d*) edge-to-edge bite; (*e*) open bite, in which the front teeth do not meet; (*f*) V-shaped arch, in which the angle of the V is formed by the upper central incisors, and the natural curve is absent (1439); (*g*) saddle-shaped arch, in which the curve is broken by a depression in the bicuspid region; (*h*) irregular position of individual teeth, such as outstanding canines and overlapping incisors (1441).

Structure.—Imperfect development of the enamel (hypoplasia), resulting probably from some error of nutrition during the period of calcification, is most commonly evidenced by the presence of grooves and pits on the surface of the affected teeth, particularly the upper incisors (1428).

In congenital syphilis the permanent incisors, particularly the upper central, are not uncommonly modified, being more or less peg-shaped and presenting a notch in the cutting-margin (1429).

1408. Two models showing an additional left upper lateral incisor and the result of the extraction of the supplemental tooth. 8745

1409. Model showing supplemental left upper lateral incisor, the corresponding canine not having erupted. 8746

1410. Model showing supplemental left upper lateral incisor, erupted inside the arch. The other teeth are very irregularly placed. 8747

1411. Model showing supplemental left upper lateral incisor, erupted within the arch. 8748

1412. Model showing supplemental upper incisor placed between the two normal central incisors. 8749

1413. Model showing supplemental right upper central incisor. 8750

1414. Six models illustrating the common forms of supernumerary teeth in the front part of the mouth. 8751

1415. Two conical supernumerary teeth.

1416. Three models illustrating a conical supernumerary tooth between the two upper central incisors, and the result of extraction of the supernumerary tooth without further treatment. 8752

1417. Model showing a caniniform supernumerary tooth between the central upper incisors, displacing the latter and leading to crowding of the other teeth. 8753

1418. Model showing two supernumerary molariform teeth in the upper incisor region. 8754

1419. Four models of other varieties of supernumerary teeth in the front part of the mouth. 8755

1420. Model showing gigantic central upper incisors. The other incisors are also large. 8756

1421. Model showing an abnormally large left upper central incisor. 8757

1422. Model showing an additional buccal cusp to the second left lower molar. 8758

1423. Model of the temporary teeth of the upper jaw, showing gemination of the left lateral incisor. 8759

1424. Model showing abnormally small size of second upper permanent molars. 8760

1425. Model showing marked elevation of cingulum on lingual surface of left upper lateral incisor. 8761

1426. (*a*) Lower lateral incisor with double root.
(*b*) Second upper bicuspid with two roots.
(*c*) Second upper bicuspid with three roots.
(*d*) Second upper bicuspid with three reots. 8762

1427. Model showing pitting and grooving of permanent teeth, resulting from hypoplasia of enamel. 8763

1428. Model including teeth extensively affected by hypoplasia of the enamel. The teeth are brown and pitted, and the polished areas in some of them are formed of eburnated dentine. 8764

There was a history of a similar condition of the teeth in collateral branches of the family.

1429. Model showing notched and peg-shaped permanent upper central incisors.

From a case of congenital syphilis. 6466

1430. Models showing general crowding of the teeth in both jaws with superior protrusion. The right upper temporary canine is retained. 8765

1431. Model showing crowding of the lower incisors. 8766

1432. Model showing crowding of teeth in both jaws, with retention of the four temporary canines and of the lower first temporary molars. The two lower permanent canines are erupting within the arch. 8767

1433. Models showing extreme degree of superior protrusion. The upper incisor teeth rested on the lower lip, and the lower incisors are elevated so as to fit against the concavity of the upper arch. 8768

The upper incisors were extracted and a denture applied.

1434. Six models illustrating the effect of treatment of superior protrusion with V-shaped arch by lateral expansion of the arch and retraction of the front teeth.

From a boy aged about 13. 8769

1435. Model showing superior protrusion and the plate used in the treatment. The front teeth were retracted by bands attached to the platinum rings in the palate-plate. 8770

From a girl aged about 13.

1436. Model illustrating inferior protrusion, probably due in part to the small size of the upper jaw. 8771

1437. Model illustrating an early stage of underhung bite (inferior protrusion) due to retention of the temporary upper central incisors, which had just been extracted. 8772

1438. Four models showing the effect of treatment in a case of superior protrusion with open bite by the removal of an upper bicuspid tooth on each side and the retraction of the upper anterior teeth. 8773

The silver plate on the front teeth was drawn backwards to a vulcanite plate worn in the palate.

1439. Model showing V-shaped deformity of the upper arch, with retention of the temporary lateral incisors and canines and eruption of the permanent canines inside the arch. 8774

1440. Model showing early stage in the formation of V-shaped arch. 8775

From a boy aged 6, who was a mouth-breather, and had already been operated on for adenoids.

1441. Two models showing outstanding upper canines and the effect of treatment by extraction of the lateral incisors. The position of the canines is already considerably improved. 8776

1442. Two models showing an outstanding right upper canine and the result, after six months, of the extraction of the conical and undeveloped lateral incisors and of the first molar on the left side, which was carious. 8777

1443. Two models of the lower jaw of a boy, in which the left lower lateral incisor and canine are crowded inside the arch. The second model shows the effect of extraction of the lateral incisor, the canine being gradually pushed into place by the action of the tongue. 8778

1444. Model showing separation of the upper central incisors by a retained temporary tooth, which was extracted. 8779

1445. Model of a lower jaw in which retention of the right temporary canine has led to crowding of the second bicuspid. 8780

1446. Model showing retention of the temporary lower first molars, with the resulting eruption of the permanent first bicuspids outside the arch. 8781

1447. Three models showing retention of the upper temporary central incisors, causing the corresponding permanent teeth to erupt inside the bite of the lower teeth. The third model shows the condition one week after the extraction of the temporary incisors and the forcible advancement of the right permanent upper central incisor. 8782

1448. Model showing displacement forwards of the permanent right upper central incisor, resulting from retention of the corresponding temporary tooth. 8783

DENTAL CARIES.

Caries is an effect solely of external causes, and is due to solution of the dental substance by acids generated by the fermentative action of micro-organisms upon food-particles. Exactly similar appearances have been observed in the crowns of human teeth worn as artificial substitutes. Caries always spreads from the surface, very frequently in a fissure of the enamel. If it commence in a fissure, a dark-coloured spot will be the first indication of its presence; but if it has attacked a surface free from any fissure, the affected part will become opaque and white, and porous and friable from decalcification, the white colour being subsequently succeeded by brown. The dentine thus exposed is in the first instance affected by the same decalcifying process, and subsequently its organic part is dissolved. The advance of caries often sets up a formation of dentine from the pulp on that wall of the pulp-cavity threatened by the advancing disease.

1449. A bicuspid tooth, the crown of which has been in great part destroyed by caries which spread from a diseased spot in the enamel. The extensive aperture has resulted chiefly from the breaking away of portions of the enamel which had been undermined by the progressive destruction of the dentine. Beyond the fractured edge of the enamel there projects a part of the dentine, softened, and discoloured; the dentine forming the wall of the space is similarly altered. On the back of the specimen is a blackened spot in the enamel marking a superficial disintegration.

1450. A series of molar and bicuspid teeth, the crowns of which have in varying degrees been destroyed by caries. 805

Erosion.

It occasionally happens that the enamel and dentine disintegrate without the ordinary appearances of dental caries, the surface in these cases being firm and often quite free from discoloration. This condition most commonly affects the necks of the teeth, leading to the formation of a smooth horizontal groove close to the edge of the gum. The exact nature of the change is not clear; probably the condition is an example of chemical solution, the process being modified by calcification of the dentinal fibres in the tubules of the subjacent portion of the dentine.

1451. A canine tooth, the greater part of the neck of the fang of which has been evenly destroyed, the surface of the excavated part being smooth as if scooped away, but not discoloured. The canal of the fang is not opened, but remains closed over by a thin layer of dentine which stands out as a rounded ridge along the bottom of the space. The surface of the erosion is opaque and lustreless, and the erosion extends for a short distance round the neck on one side; the crown is unaffected.

1452. An upper central incisor tooth. Its neck is encircled by a deep, irregular, eroded groove. The enamel, except along the margin of this groove, appears quite healthy. 306

1453. A canine tooth, the neck of which is half encircled posteriorly by a shallow groove extending through the cement to the subjacent dentine; but at no part is the pulp-cavity opened.

The tooth was a cause of intense toothache.

1454. An upper molar, one of the fangs of which has been deeply, but evenly, excavated near its root; there is a small opening in the canal of the diseased fang. The eroded surface is opaque, white, and without lustre. In the neck of the tooth, above the root of one of the other fangs, similar destructive changes have commenced; on two of the fangs a deposit of tartar has taken place, as though the tooth had lain for some time loose in its socket.

CHRONIC PERIOSTITIS OF THE FANG.

1455. A lower bicuspid tooth, the lower part of the fang of which is enlarged and bulb-shaped, probably in consequence of long-continued inflammation.

1456. A third molar tooth, the crown of which is carious and the end of the fang enlarged.

TARTAR.

Tartar is a deposit composed chiefly of carbonate of lime and magnesia, mixed with organic matter, which frequently forms upon the teeth, especially upon the outer surface of the upper molars and the posterior surface of the lower incisors. As the accumulation increases, it causes recession of the gum and absorption of the alveolar process, with consequent loosening of the teeth.

Pyorrhœa alveolaris is characterised by the presence of recesses between the teeth and gum containing pus and by loosening of the teeth, and in connection with the disease a deposit of hard dark greenish tartar is formed beneath the surface of the gum and may extend to the apex of the socket.

1457. Part of a right upper jaw with the molar and second bicuspid teeth, which are almost covered by a deposit of tartar. The deposit is much more extensive on the outer than upon the inner aspect, and forms a yellowish chalky mass. As the result of absorption of the alveolar border, the fangs of the teeth are partly exposed on the inner aspect, whilst externally the tartar overlaps the bone, which is deeply hollowed out opposite the first and second molars.

From an old man.

DISEASES OF THE TONGUE.

CHRONIC SUPERFICIAL INFLAMMATION.

Chronic surperficial glossitis may result from various forms of long-standing irritation, such as that caused by tobacco, strong spirits, &c., and is also one of the most common effects of syphilis of the tongue (see below).

The chronic inflammation may be limited to one or more patches on the dorsum or borders of the tongue or may occur in a more diffuse form. The most common result is the production of a smooth patch of a bluish-white colour (leucoplakia), in which the papillæ are more or less completely atrophied (1458). Beneath the epithelium there is a round-cell infiltration, and in the advanced stages scar-tissue forms leading to superficial induration. Ulceration of these smooth patches is not uncommon, and deep fissures are sometimes met with.

Less commonly chronic superficial glossitis results in a considerable overgrowth of the papillæ and thickening of the epithelium, with the production of warty or papillomatous patches (1459).

The chief practical importance of chronic inflammation of the surface of the tongue is its liability to be followed by carcinoma. The growth may originate in a smooth or warty patch (1458), or in an ulcer or fissure.

1458. An injected tongue, showing the development of carcinoma as a sequela of long-standing superficial glossitis. Over a large part of the dorsum the mucous membrane is smooth as the result of atrophy of the papillæ, whilst in irregular patches the normal papillary appearance remains, and scattered over the tongue, most abundantly at the tip, are numerous hypertrophied fungiform papillæ. Over a large patch on the left border and adjacent part of the dorsum the mucous membrane is raised and presents a minutely papillary or honeycombed surface, which is deeply injected. At the anterior part of this papillomatous surface there is a circular raised growth, with an ulcerated slightly nodular surface and a diameter of 1·5 cm. The inner border of the growth is considerably everted. The injection has not entered freely into this growth.

From a man, aged 62, who was under the care of Mr. Barker, in U. C. H., in 1886. The patient had suffered from spongy gums and decayed teeth for 20 years, but had not been an excessive smoker. The growth in the left side of the tip of the tongue had been noticed for five months. There was no glandular enlargement. The tongue was successfully removed with scissors, and the patient left the hospital on the 15th day. (Surg. Reg. Rep. 1886, p. 45, No. 636.)

1459. The right half of a tongue, illustrating the development of carcinoma as a sequela of chronic superficial glossitis. Upon the right border and adjacent part of the dorsum is a circumscribed warty patch, measuring 3·5 cm. antero-posteriorly. The patch is covered with large coarse papillæ and is irregularly furrowed. The edge of the patch is raised, smooth, and slightly everted, and much firmer than the surrounding mucous membrane. At the posterior and inner part of the patch the surface is less raised and less papillary, and presents more the appearance of an ulcer. In the rest of its extent the mucous membrane is covered with hypertrophied filiform and fungiform papillæ, and has in places a very velvety surface.

Microscopic Structure.—The base of the ulcer at the posterior part of the warty patch presents the structure of squamous carcinoma.

From a man, aged 52, who was admitted into U. C. H., under the care of Mr. Heath, on Nov. 11, 1884. He had had a chancre 29 years previously; there was no history of secondary symptoms. He had been a moderate smoker, and always held his clay pipe on the right side of his mouth. The disease of the tongue began as a small white patch 20 years ago. On Nov. 12 the right half of the tongue was removed with scissors and écraseur. On March 1, 1888, the patient was in good health, and there were no signs of recurrent disease. (Mr. Heath's *Case-books*, 1884, vol. i, p. 281.)

1460. A small slice of the mucous membrane of a tongue, removed by operation. In its lower half the papillæ are hypertrophied so as to form a coarse warty growth, measuring about 2 cm. in diameter. The border of the growth is well defined, except above, where it shelves off gradually to the level of the surrounding mucous membrane.

Microscopic Structure.—The enlarged papillæ are covered with a thick layer of epithelium, the superficial part of which is horny; the tissue beneath the papillæ is infiltrated with small round cells, but there is no downgrowth of epithelium.

From a patient of Sir J. Erichsen's, aged 67. The growth had existed 46 years, and had recently increased rapidly in size.

SYPHILITIC DISEASE OF THE TONGUE.

The primary syphilitic sore is occasionally seen on the tongue. Among the secondary lesions are mucous tubercles and superficial ulcers and fissures. In the later stages chronic superficial glossitis, often associated with deep fissures, and gummata, occur. Gummata are most common on the dorsum of the tongue, and may be superficial or deeply seated in the muscular substance. If untreated, a gumma of the tongue softens and discharges through an opening in the mucous membrane, leaving an ulcer which is often deeply excavated, and may present the characteristic yellowish slough. Gummatous ulcers occasionally occur on the lateral borders of the tongue, and may then be more difficult to distinguish from carcinoma than when situated on the dorsum.

1461. A tongue with the larynx and part of the pharynx. The posterior third of the tongue is the seat of a deep ulcer, which is nearly circular in outline, 5 cm. in diameter, and reaches forwards as far as the foramen cæcum and backwards to the epiglottis. The epiglottis itself, which is depressed over the aperture of the larynx, is extensively ulcerated, and in one part perforated; its right border is deeply eroded. The surface of the ulcer is uneven and ragged; its anterior edge is sinuous and slightly undermined. The submucous tissue of the pharynx is œdematous. 5286

From a man, 54 years of age, admitted into Westminster Hospital, under the care of Mr. Heath, July 7th, 1866. The breathing had become so difficult that tracheotomy was performed. The patient for a time improved, but died exhausted Sept. 25th, 1866. The exact nature of the ulcer is doubtful. It is most probably syphilitic; the destruction of the epiglottis, apparently independently of the ulceration of the tongue, is in favour of this view. (See the 'Transactions of the Pathological Society,' 1867.)

TUBERCULOUS DISEASE OF THE TONGUE.

Tuberculous disease of the tongue is uncommon; it is very rare as a primary affection, being usually secondary to similar disease of the lungs or larynx. The disease may manifest itself by the formation of nodules or fissures in the mucous membrane; but the most characteristic lesion is the tuberculous ulcer. This most commonly begins at or near the tip of the tongue, and gradually involves the anterior border and the adjacent parts of the upper and lower surfaces. The surface of the ulcer is pale, and the edge sharply defined, but not usually raised; there is rarely much induration in the base of the ulcer.

✓ **1462.** The anterior part of a tongue removed by operation for tuberculous ulceration. The tip of the tongue is rounded and the border thickened. The ulcer is extensive, but shallow; it involves the tip and border of the tongue on either side, nearly as far back as the line of the section; from the border the ulcer extends a short distance on to the dorsum, more extensively on the right side, in which situation a deep fissure runs backwards parallel with the raphe; on the under surface the ulceration is more extensive and nearly reaches the line of section. The floor of the ulcer is smooth; its edges are sinuous and well defined, but in parts distinctly shelving. In the rest of the specimen the mucous membrane is healthy. 6446

Microscopic Structure.—The base of the ulcer consists of granulation-tissue containing numerous giant cells, but no distinct tubercle-systems are seen. The round-cell infiltration extends into the superficial muscular layers.

From a man, aged 52, who was under the care of Mr. Barker, in U. C. H., in 1889. For 12 months he had suffered from troublesome cough, and occasional night-sweats. Two years before admission two small ulcers appeared under the tip of the tongue, but healed under medical treatment. Three months later ulceration again occurred in the same position, and, in spite of cauterisation, slowly extended, and was the seat of much pain. On admission the patient was wasted and there were signs of consolidation of the apex of the right lung. The front of the tongue presented a thick stunted appearance, and was the seat of the ulcer seen in the specimen. The surface of the ulcer was pale and its edges surrounded by a narrow line of congestion. There was no elevation of temperature. On the second day the anterior half of the tongue was excised with scissors. Healing was complete when the patient was discharged on the 20th day. (Surg. Reg. Rep. 1889, p. 58.)

SIMPLE TUMOURS OF THE TONGUE.

Cysts.—1. Mucous cysts are not very rare; they originate in the mucous glands and are usually of small size.

2. Dermoid cysts are met with on the under aspect of the tongue, usually, but not always, in the middle line. These cysts usually project in the floor of the mouth, and externally between the lower jaw and the hyoid bone, and may reach such a size as seriously to interfere with respiration (1463, 1465.)

3. Cysts, sometimes congenital, are occasionally met with in the region of the foramen cæcum, and probably arise in connection with the upper part of the thyroglossal duct (1466).

4. The cysticercus cellulosæ and the ordinary hydatid cyst have in rare instances been met with in the tongue.

Angioma.—Nævi of the tongue are not uncommon. The cavernous variety is the most common, but capillary nævi sometimes occur (1468).

Lymphangioma.—Circumscribed lymphatic nævi occasionally occur in the tongue. In the condition known as macroglossia the enlargement is usually the result of an increase of the lymphatic vessels of the tongue, often associated with some enlargement of the blood-vessels, and a connective-tissue overgrowth (1469).

Adenoma is occasionally met with arising in the glands of the mucous membrane (1470). The tumours arising at the posterior part of the tongue in the position of the foramen cæcum, to which the name adenoma has been applied, are in reality accessory thyroids.

Papilloma may occur as a pedunculated growth. The flat papillomatous patches sometimes met with appear to result from a chronic inflammatory overgrowth.

Fibrous and *Fatty* tumours of the tongue are very rare.

1463. An ovoid cyst, measuring 4·5 cm. in its longest diameter. The wall of the cyst is thin, and its contents like porridge.

Microscopic Structure.—The wall of the cyst consists of connective tissue, lined with a regular layer of stratified epithelium. There is no attempt at the formation of papillæ, and the skin-appendages are represented only by small sebaceous glands.

From a girl, aged 17, who was under the care of Mr. Beck in U. C. H. in 1889. A swelling in the floor of the mouth had been noticed for 18 months; it had steadily increased in size and rendered the voice indistinct. The mucous membrane of the floor of the mouth was raised over the cyst, which also caused a rounded swelling externally between the lower jaw and the hyoid bone. The cyst was removed without difficulty through a median incision in the floor of the mouth. (Surg. Reg. Rep. 1889, p. 21, No. 1261, and Trans. Path. Soc. 1890, vol. xli, p. 280.)

1464. A pyriform cyst, measuring 8 cm. in its longest diameter. The wall of the cyst is thin, and the contents like porridge. 6581

Microscopic Structure.—The cyst-wall is composed of wavy fibrous tissue and is lined with a layer of subcolumnar or almost cubical epithelium, over which is a thick layer of deeply-staining material apparently consisting of degenerated epithelial cells. No skin-appendages were seen in the section examined.

From a woman, aged 20, who was under the care of Mr. Barker in U. C. H. in 1890. For 9 years she had noticed a swelling below the left side of the lower jaw, which caused no pain or other symptoms. The cyst formed a soft tumour in the left submaxillary region, but only bulged into the floor of the mouth when pressed upwards from below. It was removed through a median submental incision. (Surg. Reg. Rep. 1890, p. 23, No. 1528, and Clin. Soc. Trans. 1891, vol. xxiv, p. 69.)

1465. A large, thin-walled, ovoid cyst, measuring 15 cm. in its longest diameter. The contents have been removed and the cyst distended with cotton-wool. 6486

Microscopic Structure.—The cyst is lined with a stratified layer of epithelium, the deepest cells of which are columnar. The contents consisted of epithelium, fat, and cholesterin, but no hairs could be found.

From a negro, aged 35, who was admitted into the Jamsetjee Jejebhoy Hospital, Bombay, under the care of Dr. Wellington Gray, on Dec. 10, 1886, suffering from a large tumour of the tongue, said to be of 2 years' duration. The tumour, which began as a small nodule under the tongue, protruded from the patient's mouth, completely filling the space between the jaws and displacing the incisor teeth. The tumour also caused a swelling in the neck as low as the thyroid cartilage. It was soft and fluctuating, and its exposed surfaces dry and fissured. The tongue was stretched over the upper surface of the tumour. The patient's voice was only an indistinct mumble and only fluid food could be taken. The general health was good. Through an incision on the under surface of the projecting tumour 40 ounces of sebaceous matter were evacuated and the whole cyst was drawn out with only slight bleeding. The chief point of attachment was at the hyoid bone. The cavity rapidly closed and the tongue resumed its ordinary appearance. The patient was discharged on Jan. 20, 1887. Much deformity of the jaws remained, but the speech was clear. (See Mr. Barker's cases of Dermoid Cyst in connection with the Tongue, Clin. Soc. Trans. 1891, vol. xxiv, p. 70.)

1466. The tongue, larynx, and part of the trachea of a child, in sagittal section. Occupying the extreme posterior part of the tongue and placed exactly in the middle line is a cyst which projects on the surface as a smooth hemispherical swelling about 1·5 cm. in diameter. The postero-inferior surface of the cyst lies in contact with the anterior surface of the epiglottis, the latter being so much pushed backwards as nearly to occlude the upper aperture of the larynx. The anterior border of the cyst lies immediately behind the circumvallate papillæ and no indication of the foramen cæcum exists. In the deep aspect of the cyst is a small depression which is the orifice of a short canal in the substance of the tongue. The cyst contained mucus. 8043

Microscopic Structure.—The cyst is lined with a thin layer of stratified epithelium, between which and the muscular tissue of the tongue is a layer of fibrous tissue forming a definite cyst-wall. In the muscular substance around the cyst are the large and deeply-placed mucous glands which are naturally present in the part.

From a male child, aged 4 months, in whom there had been some difficulty in breathing since birth, which increased until there was stridor with marked recession of the chest. With a finger in the mouth a smooth elastic swelling could be felt at the back of the tongue. Tracheotomy was performed, and the child died a week later. (Trans. Path. Soc. 1899, vol. l, p. 62.)

1467. The right half of a tongue removed by operation, injected through the right lingual artery and divided sagittally. The injected vessel, which in the first part of its course has been displayed by the removal of some of the muscular substance, is thin and very tortuous and has a diameter of 5 mm. Throughout the divided surface are cross-sections of injected branches of the lingual artery. In some places these cross-sections are arranged in series, suggesting the repeated division of one tortuous vessel. The injected vessels are especially abundant beneath the mucous membrane, on the surface of which the injected papillæ are clearly seen. 8248

Microscopic Structure.—The wall of the enlarged right lingual artery has a normal structure with well-defined elastic lamina. Throughout the muscular substance of the tongue the arteries and capillaries are very numerous and large, the latter being present in considerable numbers among the muscular fibres. Beneath the mucous membrane there is an abundant plexus of dilated capillaries, from which loops extend into the papillæ.

From a man, aged 34, in whom a swelling of the right half of the tongue was first noticed at the age of 8 or 9 years. It was attended with occasional hæmorrhage, and during the two years before the patient was admitted into U. C. H. the swelling had increased, and the hæmorrhage became so profuse as to cause intense anæmia. The right half of the tongue was involved in a soft swelling, the surface of which was smooth and scar-like, except at the centre, where there was a group of large papillæ from which the hæmorrhage occurred. On May 18, 1899, the right half of the tongue was removed with scissors by Mr. Barker, the lingual artery being tied in the mouth. On July 18 it was noted that the patient had completely recovered from the anæmia. (Mr. Barker's *Case-books*, 1899, vol. i, p. 134.)

1468. The anterior part of a tongue in sagittal section. The extremity is rounded, and in nearly the whole of its extent the mucous membrane is beset with enlarged papillæ, which are most marked close to the frænum on the right side of the middle line. On the surface of the section the superficial part of the muscular tissue presents a very fine spongy structure. 8396

Microscopic Structure.—The superficial part of the muscular tissue is the seat of a cavernous angioma, many of the spaces of which contain blood, the muscular fibres forming scattered bundles widely separated by the cavernous spaces. In some parts thin-walled blood-spaces extend up into the enlarged papillæ, and there are extravasations of blood into the most superficial part of the mucous membrane. The extremities of some of the papillæ are globular and appear to be distended by a serous or fibrinous exudation.

From a girl, aged 16, in whom enlargement of the tongue had been noticed since birth. At the age of 3 years a V-shaped piece of the front of the tongue was removed by Mr. Barker; enlarged lymphatic spaces were demonstrated in the part of the tongue that was removed. At the age of 16 the anterior third of the tongue was thick and fleshy, and at the tip there was an irregular purplish nævoid growth which bled slightly, and also a firm oval swelling in the substance of the posterior part of the tongue. The anterior half of the tongue was successfully removed. (Surg. Reg. Rep. 1887, p. 42, No. 499, and Mr. Barker's *Case-books*, 1900, vol. i, p. 112.)

1469. The greater part of a tongue, removed by operation in a case of macroglossia. The dorsal surface of the tongue is regular and is beset with closely packed rounded papillary projections, largest at the anterior part, where some of them have a diameter of about 1 mm. The surface is partly subdivided by irregular branching clefts. The under surface of the tip of the tongue is more nodular and its surface covered with very fine papillæ. There is a deep vertical fissure across the tip of the tongue. A section into the tongue displays nothing abnormal, except some thickening of the mucous membrane. 5818

Microscopic Structure.—The muscular substance presents a large excess of fibrous tissue between the fasciculi, and around the small blood-vessels there is a round-cell infiltration. There is no recognisable dilatation of lymphatic vessels. The papillæ are enlarged.

From a boy, aged 14, who was admitted into U. C. H., under the care of Mr. Heath, on May 31, 1882. He was idiotic and his speech was unintelligible; the hands were broad and short, and the second and third toes of each foot webbed; the mouth was kept habitually widely open, with the tongue protruding, but the latter could be retracted behind the teeth; there was some enlargement of the submaxillary lymphatic glands. The part of the tongue preserved in the specimen was successfully removed by a V-shaped incision with scissors, the sides of the V being drawn together with silk sutures. (Mr. Heath's *Case-books*, 1882, vol. i, p. 220.)

1470. A small calcareous nodule removed from the under surface of the front of the tongue, together with drawings illustrating the structure of the soft growth in which the nodule lay. 6411

Microscopic Structure.—The soft growth was composed of cellular tissue, the cells being spindle-shaped or round, and irregularly shaped acini lined with cubical epithelium. Some of the acini were dilated into small cysts containing a brownish almost structureless material.

From a woman, aged 24, who had noticed a tumour on the under surface of the left side of the tongue near the tip for 5 weeks. In this situation there was a grey slough as large as a shilling, over a hard lump, which also formed a slight projection on the upper surface of the tongue. The swelling was punctured with a trochar and the calcareous nodule detected. The latter was removed with sinus-forceps and was at first thought to be a foreign body. The wound remained open, and a few weeks later a scraping from it was microscoped and found to present the structure of a tumour. The whole growth was therefore removed with scissors and the wound readily healed. (See Godlee, Trans. Path. Soc. 1887, vol. xxxviii, p. 346.)

MALIGNANT TUMOURS OF THE TONGUE.

Carcinoma of the tongue is extremely common and is always of the squamous-cell variety. It originates superficially, often in an ulcer, fissure, or scar in the mucous membrane, or as a sequel of chronic superficial glossitis (1458, 1477). The tumour usually ulcerates early and presents the features common to carcinomatous ulcers in other situations, but sometimes it assumes a more warty form of slower growth (1472). A section through a carcinoma of a tongue shows the opaque-white growth invading the muscular substance, and from the tongue itself the disease gradually spreads to the floor of the mouth, the lower jaw, the fauces, or the wall of the pharynx. By this extension the mobility of the tongue is interfered with. The favourite seat of carcinoma of the tongue is the lateral border at or behind the middle (1471), but any part of the surface may be affected, and the growth not uncommonly begins on the dorsum (1475), in the neighbourhood of the frænum (1482) or at the extreme posterior part of the tongue. Secondary deposits in the lymphatic glands occur early; the exact position of the infected glands varies with that of the primary growth, but the glands most commonly involved are those lying over the bifurcation of the carotid artery.

In several of the older specimens in the Museum the operation for the removal of a part or the whole of the tongue was performed by the écraseur, but at the present time the tongue is usually excised from within the mouth with scissors, or through an incision below the jaw, the lymphatic glands being at the same time freely removed.

Sarcoma of the tongue is rare (1487).

1471. A tongue removed by the écraseur behind the circumvallate papillæ. On its left side is a deep carcinomatous ulcer reaching almost from the raphe to the reflexion of the mucous membrane on the outer side, and from the circumvallate papillæ forwards for a distance of 4 cm. On the inner side the edge of this ulcer is deeply undermined; posteriorly it is thick and everted, but is everywhere very irregular. The surface of the excavation is also very uneven, the disease having extended much more deeply in some situations than in others. 5346

From a patient who was admitted into U. C. H., under the care of Sir J. Erichsen, in June 1870. The disease was first noticed about Christmas 1869, as a small pimple on the middle of the left border of the tongue, which became painful, and about April 1870 began to ulcerate. The stumps of two teeth on this side were then extracted. The ulceration, however, progressed, and frequent hæmorrhages took place. On admission, the ulcer was about three-quarters of an inch in diameter, with irregular raised edges and inflamed base, covered with a yellowish purulent layer; the surrounding tissues were much indurated. There was no enlargement of the glands in the neck. The tongue was removed by means of the écraseur; but owing to the softness of the tissues at its base the division occurred too rapidly, and both the lingual arteries bled freely. The patient recovered; but the disease returned, and he died about twelve weeks after the operation.

1472. A tongue removed by operation for an extensive carcinoma of the left half. The growth involves nearly the whole of the left border of the tongue and thence extends on to the dorsum as far as midway between the middle line and the right border. The general surface of the growth is raised and in a considerable part of its extent deeply ulcerated and covered with small, irregular, rounded prominences. Around the right margin of the growth where it overhangs the surrounding mucous membrane the surface is not ulcerated, but presents a peculiar honeycombed or papillary appearance. The front part of the tongue beyond the limits of the tumour presents considerable enlargement of its papillæ, but farther back the surface is smooth and the papillæ are atrophied.

There is no history to the specimen.

1473. The left half of a tongue, removed by operation for a small carcinoma of the left border near the tip. The growth forms an irregularly rounded ulcer 1·5 cm. in diameter, with a slightly depressed nodular surface and well-defined margin. The mucous membrane of the tongue is irregular and thickened, and the papillæ are atrophied. 7276

From a man, aged 65, who was under the care of Mr. Barker in U. C. H. in 1894. The disease had been noticed for one month. There was no glandular enlargement. The left half of the tongue was successfully removed with scissors. (Surg. Reg. Rep. 1894, p. 38, No. 2243.)

1474. A tongue, together with the sublingual salivary gland of the left side, removed by operation for carcinoma of the dorsum. The growth, which forms an ulcer 1 cm. in diameter, is situated on the left half of the tongue nearly 2 cm. behind the tip. The surface of the ulcer is slightly excavated and the margin, especially internally, rounded and thickened. The ulcer is surrounded by a narrow zone of infiltrated mucous membrane in which the papillæ, which are normal in other parts, are not recognisable. 7435

1475. A tongue removed by operation for carcinoma of the dorsum. The growth forms an irregular ulcer which reaches from the right border to beyond the middle line and from near the tip in front backwards for nearly 4 cm. The ulcer is deeply hollowed in its central part and its margin is flush with the surrounding surface, except at the right border of the tongue, where it is raised. Over the anterior two-thirds of the remaining surface of the tongue the mucous membrane is thickened and the papillæ are atrophied. 6303

From a man, aged 54, who was under the care of Mr. Heath, in U. C. H., in July 1887. An excoriation on the dorsum of the tongue, attributed to the irritation of a tobacco-pipe, was noticed 4 months before admission. There were enlarged glands in the neck. The tongue was removed with scissors from within the mouth. The patient was sent to a convalescent home on the 17th day, and died a fortnight later; cause of death not stated. (Surg. Reg. Rep. 1887, p. 45, No. 1427.)

1476. A sagittal section of a tongue, the seat of carcinoma, which involved the dorsum and left border. Involving the posterior part of the dorsum and left border is a deep transverse fissure surrounded by a layer of new growth nearly 1 cm. in thickness. The growth invades the muscular substance of the tongue and presents in section an opaque granular appearance. 8262

Microscopic Structure.—The growth is a typical squamous-cell carcinoma.

From a man, aged 62, who was an inmate of the London County Asylum, Colney Hatch, under the care of Mr. Cecil Beadles, suffering from mania. The growth in the tongue was first noticed in January, 1899, as a small raised tumour about the middle of the left border. The growth gradually spread and ulcerated, the tongue became contracted and fixed on the left side, and mastication and swallowing became difficult. Enlargement of the lymphatic glands occurred, first on the left and then on the right side of the neck. The patient became emaciated, and died on May 8, 1899.

1477. The anterior two-thirds of a tongue removed obliquely so as to include more of the right than of the left side. On the right border is a carcinomatous growth which extends from the tip backwards nearly to the line of section; the growth encroaches on the dorsum and extends downwards to the floor of the mouth. The central part of the tumour is deeply and irregularly excavated, so as to cause a considerable loss of substance in the side of the tongue. Around the excavation the growth presents a raised coarsely warty or nodular border, which, especially in front, considerably overhangs the surrounding mucous surface. The remaining part of the anterior third of the tongue and the part of the left border preserved in the specimen presents an extremely dense rugged surface, as if resulting from a great thickening of the epithelium. This surface contrasts strongly with, and is sharply marked off from, the rest of the dorsum, over which the filiform papillæ are hypertrophied, so as to produce a coarse velvety surface on which a few enlarged fungiform papillæ are seen. 7250

Microscopic Structure.—A section of the surface of the left half of the tongue shows atrophy of the papillary layer with a great heaping up of the superficial epithelium. Between the papillary layer and the muscular substance is a thick fibrous layer containing comparatively few cell-elements. A section of the edge of the ulcer on the right border of the tongue presents the typical structure of squamous-cell carcinoma.

The tongue was removed by Mr. Heath from a man who had been under treatment 9 years previously for syphilis of the tongue.

1478. The anterior three-fourths of a tongue, removed by operation. In its left half the dorsum presents anteriorly an irregularly nodular, slightly raised surface, which passes imperceptibly into a smooth ulcerated surface along the left border, and a similar but nodular surface on the under aspect. In its central part the papillæ of the dorsum are slightly hypertrophied so as to render the surface unusually velvety. Along the right border the mucous surface is thickened and irregularly wrinkled, and at about the middle presents a smooth ulcerated nodular projection. 7251

Microscopic Structure.—Sections of the growth from both sides of the tongue present the structure of squamous-cell carcinoma.

1479. The left half of a tongue, removed by operation for carcinoma. The growth involves the posterior part of the border, and forms an irregular ulcer having an antero-posterior measurement of nearly 4 cm. The central part of the ulcer is deeply excavated and the anterior part forms a deep horizontal fissure. The edges of the ulcer are thickened and rounded but not everted. 7247

From a man, aged 41, who was admitted into U. C. H., under the care of Mr. Heath, July 11, 1894. The disease of the tongue was of 6 months' duration and commenced as a small lump; there was an enlarged gland below the angle of the jaw on the left side. On July 18, the left half of the tongue was removed with the scissors and écraseur. Discharged on August 2. (Mr. Heath's *Case-books*, 1894, vol. iii, p. 355.)

1480. A tongue, removed by operation for carcinoma and divided sagittally. The growth infiltrates the whole thickness of the posterior part of the tongue for a distance of nearly 4 cm., completely replacing the muscular substance. The mucous membrane covering the growth at the extreme base of the tongue is ulcerated. The cut surface of the growth has a dense opaque appearance, and in the central part is marked by intersecting bands of white fibrous tissue. 7271

From a man, aged 63, who was admitted into U. C. H., under the care of Mr. Heath, on Oct. 15, 1894. The disease was first noticed in January, 1894, as a hard lump and furrow at the back of the tongue, which was at first regarded as syphilitic. There was no pain, but profuse salivation. On admission the patient was emaciated. The extreme base of the tongue was involved by a hard growth, slightly ulcerated in the middle line. There was an enlarged gland beneath the left sterno-mastoid. The whole tongue was removed, back to the epiglottis, by Syme's operation. Death occurred from collapse 5 hours after the operation; an extension of the growth to the tonsil of the left side had been incompletely removed. (Surg. Reg. Rep. 1894, p. 36, No. 2274.)

1481. A tongue, together with a large ulcerated carcinoma involving its under surface and the adjacent part of the floor of the mouth, and the submaxillary and sublingual salivary glands, and several diseased lymphatic glands of the right side. The ulcerated growth extended from the canine tooth on the left side to the second molar tooth on the right side; its surface is irregular and nodular. The salivary glands are invaded by the growth as well as the lymphatic glands preserved in the specimen. The dorsal surface of the tongue is unusually velvety. 7567

From a man, aged 58, who was under the care of Mr. Horsley, in U. C. H., in 1896. The disease of the tongue had been noticed for 8 months. The parts preserved in the specimen were successfully removed by Kocher's operation. (Surg. Reg. Rep. 1896, p. 62, No. 918.)

1482. The anterior two-thirds of a tongue, together with the anterior part of the floor of the mouth and the sublingual salivary glands. Involving the adjacent parts of the under surface of the right side of the tongue and floor of the mouth, and extending slightly beyond the middle line, is an ulcerated carcinoma having a transverse measurement of 2·5 cm. The edges of the ulcer are well-defined and raised, and the surface is nodular and deeply grooved transversely in the sulcus between the tongue and the floor of the mouth. The other parts of the tongue are normal. 6145

The parts were removed by operation from a man, aged 35, under the care of Mr. Barker, in 1885. The growth had been noticed for 7 weeks; there was no glandular enlargement.

1483. The anterior two-thirds of a tongue, together with the central 3·5 cm. of the lower jaw and the intervening part of the floor of the mouth, removed by operation for carcinoma. The latter forms a large ulcer involving the under surface of the tongue as far forward as the tip, the corresponding part of the floor of the mouth, and the posterior aspect of the lower jaw and gum in the incisor region. The margins of the ulcer are well-defined and sharply raised, and the surface is irregularly nodular. The dorsal surface of the tongue is normal, and the sawn surface of the jaw on each side presents a healthy appearance. 6272

From a man, aged 51, who was under the care of Mr. Heath, in U. C. H., in 1887. A sore under the front part of the tongue was first noticed about 3 months before admission; it had been treated medicinally and with the cautery. On March 16 the parts preserved in the specimen were removed by operation, the division of the tongue being effected with the écraseur. On April 3 the temperature rose and patient complained of pain in his chin and cheeks; on April 4 there was a typical erysipelatous rash on the chin and right cheek. Discharged, relieved, on April 18. (Surg. Reg. Rep. 1887, p. 43, No. 587.)

1484. Portion of the anterior part of a lower jaw, corresponding in extent with the incisor and canine and the first left bicuspid teeth, together with the front part of the tongue and portions of the sublingual glands, the parts having been removed for carcinoma affecting the lower part of the tongue and infiltrating the soft parts lying in the space behind the middle portion of the jaw. The disease is confined to the under part of the tongue and adjoining portion of the floor of the mouth.

The patient, a shoemaker, aged 52, was admitted into U. C. H., under Mr. Heath's care, in September 1875. In January 1874 he noticed that one of the glands beneath the jaw, on the right side, was swollen and painful. Soon after this he noticed a sore place under the tongue, on the left side, which healed; but the gland remaining enlarged and painful, he went to the Leamington Hospital, where iodine was applied with benefit. In September 1874 the gland beneath the jaw again swelled and suppurated, and about this time the patient observed that he had slight difficulty in articulation. In August 1875 he went to the Coventry Hospital, where he was advised to have his tongue excised, which he refused. He afterwards was admitted into St. Bartholomew's Hospital, where a portion of the tongue was removed by Mr. Holden with considerable relief. When admitted into U. C. H. the patient complained of considerable pain in the lower jaw, and of great tenderness and pain in the occipital region; on the right side beneath the jaw there was a hard gland, and on the left side a mass of glands hard and tender to the touch. The parts preserved in the specimen were removed after division of the lower lip, the section of the tongue being effected with the galvanic écraseur.

When the patient was discharged, November 6, 1875, the wounds of the soft parts had healed, but the jaw was not united; no recurrence had at that time occurred. Sequestra came away from the lower jaw, which then united at an acute angle, the patient recovering in a remarkable manner the power of swallowing and speaking.

The patient remained free from recurrence, and died in January 1899. ('Lancet,' 1899, vol. i, p. 1354.)

1485. The anterior two-thirds of a tongue, together with the chin, central part of the lower lip, part of the lower jaw, and the floor of the mouth, removed by operation for a very extensive carcinoma. The growth forms a large, irregular, ulcerated cavity involving the under surface of the tongue, the floor of the mouth, and the central portion of the lower jaw. The incisor portion of the latter is almost completely destroyed by the growth, which has extended forward into the soft parts of the chin. 6592

There is no history to the specimen.

1486. A tongue, a considerable part of the left half of which had been removed for carcinoma 18 months before death. At the centre of the left border of the tongue is a scar resulting from the healing of the wound and producing a shallow notch, from which several sulci radiate into the mucous membrane. The tip of the tongue is drawn considerably to the left. There is no evidence of recurrence of the disease.

From a man, aged 57, the left part of whose tongue had been removed for carcinoma in May 1873. During the operation, which was performed with the galvanic écraseur and scissors, a large amount of blood was drawn into the trachea; laryngotomy was performed, and the blood sucked from the chest. In December 1874 there was no evidence of recurrence in the mouth or in the neck; on the fourth toe of the right foot there was a carcinoma of the skin which had been noticed for 4 months; there was an enlarged gland in the right groin and on the right side of the chest a large tumour projected in the mammary region. At the *post mortem* examination it was found that the tumour of the chest was the prolongation forwards of a large mass in the substance of the right lung; there were large masses of growth in the glands of the anterior and posterior mediastina, a number of nodules in the pericardium, and two or three nodules in the left lung. The growth on the toe is preserved among the tumours of the skin. (Godlee, Trans. Path. Soc. 1876, vol. xxvii, p. 253.)

1487. A tongue, removed by operation for sarcoma. The whole tongue appears to be infiltrated with a soft growth in which all trace of the muscular substance is lost on the surface of the section, except at the lower part. On the surface of the tongue the growth forms a rounded prominent projection at the middle of the right border, while in all other parts the surface is friable and irregular, and presents no normal mucous membrane.

Microscopic Structure.—The tumour presents the structure of a sarcoma which has been very extensively broken down by hæmorrhage and altered by inflammation. The cell-elements are mostly large and rounded, but some are oval or even spindle-shaped. The blood-spaces are very abundant, and take the form of wide capillaries, many of which are bounded only by large rounded cells.

The tongue was removed from a woman by Mr. Heath with the galvanic écraseur. The patient did well, and was in good health 3 years after the operation.

DISEASES OF THE SALIVARY GLANDS.

Inflammation of the Salivary Glands.

Inflammation of the Salivary Glands, most commonly the parotid, forms the characteristic phenomenon of mumps.

Inflammation of the glands may also result from the presence of calculi or foreign bodies in the ducts (1492), or from the direct extension of inflammatory processes from the mouth. The condition of the mouth is probably the most important cause of the parotitis which is met with as a complication of abdominal operations and diseases. Acute parotitis, often ending in suppuration (parotid bubo), may occur as a complication of acute infective diseases (1488), such as typhoid fever, and as one of the manifestations of pyæmia.

1488. A wax model of a parotid salivary gland in which suppuration followed an attack of fever. The gland is greatly enlarged, and on the cut surface the swollen lobules stand out very prominently and present many small yellow areas of suppuration. 4157

Presented by Sir William Jenner.

Salivary Calculi.

Calculi may form in the ducts of any of the salivary glands, but they are most common in Wharton's duct. They are usually small and spindle-shaped (1492) and composed of phosphate of lime with a small proportion of carbonate of lime and organic matter. Large salivary calculi are rare, but a weight of several grammes has been recorded. The most common result of the obstruction of the duct of a salivary gland by a calculus is swelling of the gland itself, which may become permanent and attended with inflammatory induration. Less commonly the obstructed duct may undergo cystic dilatation or the irritation of the calculus may lead to suppuration.

Small calculi are occasionally met with in the substance of the salivary glands, causing enlargement and induration (1493).

1489. A salivary calculus the size of a pea. The surface of the calculus is almost covered with a brownish layer of organic matter, but where this is absent a white chalky substance is exposed. 5488

The calculus was removed from Wharton's duct. From a dissecting-room subject.

1490. A large salivary calculus and several smaller calculi and fragments, together weighing 6·8 grammes. The large calculus is irregularly pyramidal in shape and measures 2 cm. in its greatest diameter. The base of the calculus presents a large polished facet; the rest of its surface is finely granular. Of the smaller fragments the largest also present facets on some of their surfaces. The calculi are hard and of a dirty yellowish-white colour. 6621

The calculi were removed from Wharton's duct.

1491. A small elongated body, 1 cm. in length, consisting partly of calcareous matter and partly of a semitransparent resin-like material. 8517

From a man, aged about 40. Swelling and pain over the left parotid gland was followed by a small painful swelling beneath the angle of the jaw, which proved to be a small abscess containing the body preserved in the specimen. The exact nature of the concretion is doubtful.

1492. Part of a submaxillary salivary gland, together with Wharton's duct, removed by operation. Lying in the duct is a small spindle-shaped calculus measuring 5 mm. in length. 7542

From a female patient, aged 20, under the care of Mr. Horsley. There had been attacks of swelling of the gland after meals, the last attack being attended with acute pain.

1493. A submaxillary salivary gland, together with three calculi, removed by operation. The fibrous septa of the gland are thickened. The calculi are irregularly rounded, the largest measuring 8 mm. in diameter. The cavity in the gland in which the calculi were embedded is indicated by bristles. 6369

From a woman, aged 30, under the care of Mr. Godlee. For some years there had been pain in the right submaxillary region, with occasional swelling after food. Before the operation the small tumour which could be felt in the submaxillary region was thought to be a tuberculous gland.

TUMOURS OF THE SALIVARY GLANDS.

Encapsuled tumours are not uncommonly met with in connection with the salivary glands. The tumours are most commonly found in the parotid region, usually superficial to the parotid-gland itself, and are known as "parotid tumours." Their rate of increase varies, but is usually slow, and in the later stages the growth may extend beyond its capsule and invade the surrounding structures. The microscopic structure of the specimens is in accordance with the view that they are endotheliomata and not mixed glandular tumours, as they were formerly held to be. The ground-substance may be in parts cartilaginous.

The salivary glands, especially the parotid, are occasionally the seat of an infiltrating sarcoma or carcinoma.

1494. A small solid tumour, measuring 2 cm. in diameter, which was removed from the substance of the left parotid gland. The surface of the tumour is lobulated and covered with a thin capsule. The cut surface is opaque white in colour. 8620

Microscopic Structure.—The tumour presents a ground-substance which in parts is fibrillated and contains small spindle-shaped cells, and in other parts is hyaline. Scattered throughout the ground-substance are spaces surrounded by one or more layers of cells with rounded or oval nuclei; in other parts similar cells instead of surrounding definite spaces form irregular columns and masses throughout the stroma. The tumour is an endothelioma.

The tumour was removed by Mr. Godlee from a woman aged 21; it was of 18 months' growth and was embedded in the superficial part of the left parotid gland.

1495. A solid lobulated tumour, measuring 5 cm. in its greatest diameter, removed from the parotid region. Some of the lobules are very prominent and the surface of the tumour appears to be covered everywhere by a thin fibrous capsule. The cut surface of the growth is slightly mottled. 7514

Microscopic Structure.—The ground-substance is in parts delicately fibrillated and in other parts hyaline. Ramifying throughout the stroma are columns and masses of rounded and oval nuclei, which in many places are so arranged as to enclose well-defined tubular spaces, many of which contain a finely granular material. The tumour is an endothelioma.

From a woman, aged 35, under the care of Mr. Godlee. The tumour was of slow growth and was easily enucleated.

1496. A solid slightly lobulated tumour, measuring nearly 5 cm. in diameter, from the right submaxillary region. The surface is smooth and covered with a thin capsule. Attached to one aspect of the tumour is a portion of the submaxillary salivary gland, which is normal in appearance. The cut surface is imperfectly separated into lobules by septa of fibrous tissue, and presents a dense yellowish substance with numerous small semitranslucent areas of a grey colour. 7933

Microscopic Structure.—The ground-substance of the tumour is abundant and consists of a loose connective-tissue reticulum which has in parts undergone a granular or hyaline change. In the stroma are collections of cells with rounded or oval nuclei; the cells are arranged in masses and slender branching columns; in a few situations several layers of the cells surround well-defined spaces. The tumour is an endothelioma.

From a woman who died at the age of 76 from cerebral hæmorrhage after senile dementia of 2½ years' duration. A tumour in the right submaxillary region was known to have been present for two years without any appreciable alteration in size. (See Beadles, Trans. Path. Soc. 1897, vol. xlviii, p. 66.)

1497. A lobulated tumour, measuring 8 cm. in its longest diameter, removed from the parotid region. Over the greater part of its extent the surface is smooth and covered with a thin capsule. On one aspect the growth has been ruptured during its removal, but here also it appears to have been definitely encapsuled. At the upper part of the specimen a portion of the parotid salivary gland is spread out on the surface of the tumour. The cut surface of the tumour presents opaque yellowish-white areas with streaks and spots of pale grey colour. 7388

Microscopic Structure.—The tumour consists of masses of spheroidal or oval cells lying in a fibrillated stroma. The cells are arranged in tubular spaces, in some of which two layers can be distinctly recognised around a lumen.

1498. An ovoidal lobulated tumour, 11 cm. in its longest diameter, removed from the left parotid region, bisected. Adherent to one aspect of the growth is an elliptical strip of skin including a scar. Over the rest of its extent the lobulated surface of the tumour is smooth and covered with a fibrous capsule, and at one part presents a large depression, probably corresponding to the angle of the jaw. At the lower end of the specimen a large cyst has been opened; it is partly filled with friable tumour-substance. The section of the tumour shows a small amount of fibrous tissue, especially in its central part. The tumour-substance is yellow in colour, but scattered through it are areas of a semitranslucent grey jelly-like substance. 6517

Microscopic Structure.—The stroma consists of branching cells lying in a fine reticulum. In the stroma are irregular masses and columns of spheroidal cells; in some of the cell-masses definite spaces are present, which are surrounded by several layers of cells or in some places by a distinct endothelium. The tumour is probably an endothelioma.

From a man, aged 37, who was under the care of Mr. Heath in December 1889. Fifteen years before a movable tumour as large as a pea was noticed behind the left angle of the lower jaw. Six years later it had reached the size of a large orange and was removed. Two months after the operation a lump was noticed beneath the scar and slowly increased in size. On admission a large lobulated tumour was situated below the left ear, the largest lobule resting on the patient's coat-collar. The overlying skin was marked by dilated veins, but was not adherent to the tumour except along the scar resulting from the previous operation. There was no facial paralysis. The tumour was easily removed, chiefly by enucleation with the finger. The patient was discharged on the 19th day. (Surg. Reg. Rep. 1889, p. 63, No. 2152.)

1499. A tumour from the left parotid region, in section. It is lobulated, encapsuled, and measures 4·5 cm. in diameter. It consists of very soft gelatinous tissue divided into separate lobes by denser fibrous bands. 8689

Microscopic Structure.—In many parts the tumour consists of myxomatous tissue; in other parts are tubular spaces lined with one or more layers of spheroidal cells. The tumour is an endothelioma.

From a woman, aged 38, in whom a tumour in front of the left ear had been slowly growing without pain for 5 years. The tumour was movable, lobulated, and soft; it was easily enucleated. (Mr. Godlee's *Case-books*, 1901, No. in Hosp. Reg. 368.)

1500. A solid lobulated tumour, measuring nearly 2·5 cm. in diameter. The surface is invested with a delicate capsule of connective tissue. In the recent state the cut surface was nearly white, in some parts opaque, and in others more translucent. 8744

Microscopic Structure.—The tumour is an endothelioma. The interstitial tissue is composed chiefly of a very delicate fibrillated stroma containing small irregular, branched cells; this is traversed by slender branching columns of small spheroidal cells, which become in some parts much larger and present a very distinct lumen.

The tumour was removed by Mr. Godlee from a young man; it was situated in the middle of the right cheek and had been growing for about 5 years; it was easily enucleated, and its posterior border lay in contact with an apparently unusually large socia parotidis. The patient had also tuberculous disease of the right testicle.

DISEASES OF THE TONSILS.

Chronic Enlargement of the Tonsils.

Chronic enlargement of the tonsils is met with as a true hypertrophy and as a result of repeated attacks of acute inflammation. In true hypertrophy the enlargement involves chiefly the lymphoid follicles, and at the same time the crypts which open on the surface of the tonsil are increased in size (1503). Hypertrophy of the tonsils is frequently associated with the presence of adenoid vegetations in the pharynx and much less frequently with hypertrophy of the lymphoid tissue at the base of the tongue (1501). Calculi have occasionally been met with in the crypts of an enlarged tonsil.

1501. A tongue with the larynx, tonsils, and part of the pharynx. Both the tonsils are considerably enlarged and project far into the fauces. Each tonsil measures vertically about 4 cm. The lymphoid follicles of the base of the tongue (lingual tonsils) are proportionately enlarged, and form a series of mutually adapted swellings extending across the tongue and reaching on either side to the enlarged tonsils, so as to form one deeply cleft semicircular mass. The central masses rest behind upon the front of the epiglottis, and extend forwards as far as the foramen cæcum. 1247

1502. Part of a tongue, together with the larynx, part of the pharynx and palate, and the left tonsil. The tonsil is converted into a considerable mass of irregular papillary processes. Continuous with these are a series of similar but smaller papillary growths, which extend completely across the base of the tongue, reaching backwards to the epiglottis and forwards nearly to the foramen cæcum. There are two similar rounded growths on the right wall of the pharynx on a level with the epiglottis. 5757

From a woman, in whom there was also a calcified cystic goitre.

1503. The projecting parts of two enlarged tonsils removed by operation. Their free surface has a largely reticular character, resulting from an exaggeration of the loculated surface naturally presented by the tonsils. The divided surfaces exhibit a great enlargement of the follicular cavities, the contents of which have fallen out; the connective tissue between the spaces is increased in amount. The cut surfaces have each a diameter of 3 cm. 2604

Tumours of the Tonsils.

Simple tumours of the tonsils, such as papilloma, are rare. Occasionally enlargement of one or both tonsils occurs in association with lymphadenoma of the cervical lymphatic glands.

Sarcoma of the tonsil has usually the structure of a lymphosarcoma, and is associated with an early development of secondary growths in the glands of the neck (1507).

Carcinoma of the tonsil is always of the squamous-cell variety; the gland may be attacked primarily or by extension from a neighbouring part, such as the base of the tongue (1508).

1504. A rounded tumour of the right tonsil, together with an adjacent portion of the soft palate. The tumour has a vertical measurement of about 5 cm. The surface of the tumour is in some parts smooth, but in others has a layer of cellular tissue adherent to it. On its deep aspect it is deeply cleft. A section has been made into the tumour and exposes a dense homogeneous tumour-substance, which in the recent state was pinkish white in colour.

Microscopic Structure.—The tumour is a lympho-sarcoma. It consists of a delicate reticulum of branching cells, the spaces being occupied by small round cells. Blood-vessels are numerous.

From a woman, aged 74, who first noticed uneasiness in her throat, which was regarded as due to a "quinsy," in November 1883. On February 22, 1884, Mr. Barker found the right tonsil much enlarged, harder than its fellow, and uneven, but movable and painless. There was an enlarged movable gland opposite the right cornu of the hyoid bone. On March 8 the gland was first removed through an incision along the anterior border of the sterno-mastoid, and then the tumour of the tonsil was enucleated by blunt dissection through a vertical incision made with the Paquelin's cautery in the anterior pillar of the fauces. A small nodule of growth was also removed from the left side of the base of the tongue, and three weeks later another nodule was removed close to the position of the first. On May 27, although there was no recurrence in the pharynx, glandular enlargement was advancing on both sides of the neck. The patient died on July 14, without having had any throat-symptoms. (See Barker, Trans. Path. Soc. 1886, vol. xxxvii, p. 218.)

1505. A rounded tumour of the right tonsil, 4 cm. in diameter. The free surface of the tumour is covered with mucous membrane and presents a deep cleft, within which the surface is irregularly subdivided. The deep surface of the tumour is covered with loose connective tissue, and a section into this part of the growth displays an opaque white homogeneous tumour-substance. 6137

Microscopic Structure.—The tumour consists of small round cells lying in a homogeneous matrix. There is no retiform stroma. Bundles of striated muscle-fibres are embedded in the superficial part of the growth.

From a man, aged 72, who was under the care of Mr. Beck, in U. C. H., in 1885. Three months before admission slight difficulty in breathing and enlargement of the right tonsil were noticed; the tumour of the tonsil felt elastic and was slightly movable; there was a slightly enlarged gland on the right side of the neck. The tumour of the tonsil was easily enucleated through an incision over it. Four months later there was no evidence of recurrence, and the gland in the neck had not increased in size. (Surg. Reg. Rep. 1885, p. 46, No. 1332; and Trans. Path. Soc. 1886, vol. xxxvii, p. 221.)

1506. An ovoidal tumour of the left tonsil, measuring 6 cm. in its longest diameter. The free surface is covered at its border with smooth mucous membrane, and the central part is very irregular and composed of closely packed, irregular, projecting lobules. On its deep aspect the growth is friable, and has been torn through in removal. 6639

Microscopic Structure.—The growth is a lympho-sarcoma. Granular muscular fibres are present in the substance of the growth.

From a man, aged 67, who was admitted into U. C. H., under the care of Mr. Heath, in 1889. Four months before admission the left tonsil was pricked with a fish-bone; a month later the tonsil began to enlarge, and six weeks before admission the swelling broke and "some matter containing a fish-bone" came away. On admission, the patient was well nourished; the isthmus of the fauces was almost filled by a tumour of the left tonsil; there was an enlarged gland behind the left angle of the lower jaw. The gland was excised, and the tumour of the tonsil was removed from the mouth through a vertical incision, made with Paquelin's cautery over its outer part. The patient left the hospital on the 17th day; three months later there was extensive recurrence, extending to the back of the pharynx and into the soft palate, and a mass of enlarged glands on the left side of the neck. (Surg. Reg. Rep. 1889, p. 62, No. 908.)

1507. A tumour of the left tonsil, together with two secondary glandular deposits. The tumour of the tonsil has been removed with the corresponding part of the wall of the pharynx; it is oval in outline, and measures 3·5 cm. in its longer vertical diameter. Its surface is considerably raised, in some parts lobulated and in others formed by thick irregular processes. At the edge of the tumour the surrounding mucous membrane rises continuously on to its surface and covers the latter, except over one area, which is superficially ulcerated. The deep aspect of the growth is covered in parts by the muscular tissue of the pharynx, the growth being entirely confined to the cavity of the fauces and showing no tendency to extend deeply. The lymphatic glands are considerably enlarged and infiltrated throughout with opaque whitish growth. 6908

Microscopic Structure.—The tumour is a lympho-sarcoma.

From a woman, aged 53, who was admitted into the Great Northern Hospital in June 1892. The symptoms dated from Christmas 1891, and consisted of slight soreness of the throat and difficulty in swallowing. On June 20 the tonsil and the enlarged glands were removed through an incision in the neck after ligature of the external carotid artery. On July 14 other enlarged glands were removed from behind the left sterno-mastoid. The patient left the hospital on July 23; on March 3, 1893, patient was in good health, but the right tonsil was now considerably enlarged and there was some enlargement of the glands on both sides of the neck. (See Raymond Johnson, Clin. Soc. Trans. 1893, vol. xxvi, p. 136.)

1508. A larynx, lower part of pharynx, &c. Involving the position of the right tonsil and extending widely to the neighbouring parts of the pharynx is a carcinomatous growth. From the position of the tonsil the growth extends along the border of the right half of the soft palate as far as the uvula; on the wall of the pharynx it spreads across the middle line and forms a prominent coarsely warty mass immediately behind the posterior pillar of the fauces, the left tonsil being unaffected; downwards on the left side of the middle line the growth extends beside the left aryteno-epiglottidean fold, which is pressed inwards by the papillomatous growth. In the position of the right tonsil, where the growth probably originated, the tumour forms an irregular ulcer with well-defined, raised, thickened edges. Immediately outside this part of the pharynx is a considerable mass of growth, probably a secondary deposit in the lymphatic glands, in which some of the branches of the carotid artery are deeply embedded. In a corresponding position on the left side there is also a secondary glandular deposit adherent to the outer aspect of the wall of the pharynx. 5463

Microscopic Structure.—The tumour is a squamous carcinoma with very numerous nests.

From a woman, aged 57, who was in U. C. H. in 1879; death resulted from pneumonia. (Surg. Reg. Rep. 1879, p. 57.)

DISEASES OF THE PALATE.

The palate is liable to the various ulcerations which affect it in common with other parts of the throat.

Among the simple tumours of the palate are dermoid cysts, nævi, papillomata (1511), and solid encapsuled tumours, usually called adenomata, and having a structure resembling that of the tumours of the parotid region (1510).

Squamous carcinoma rarely affects the soft palate, except by extension from surrounding parts, such as the base of the tongue.

Specimens of carcinoma of the hard palate are included among Diseases of the Jaws.

1509. A tongue with the fauces and parts of the soft palate and pharynx. Embedded in the right half of the soft palate is an oval lobulated tumour, measuring nearly 4 cm. in its longest diameter. The inner part of the tumour causes a distinct bulging in the position of the tonsil. The outer surface of the tumour, from which the surrounding soft parts have been removed, is covered with a thin capsule of fibrous tissue. A section has been made into the anterior part of the tumour; the cut surface is marked by small opaque white areas embedded in a more yellow substance. 3735

Microscopic Structure.—The condition of the specimen renders satisfactory microscopic examination impossible.

The specimen was obtained after death from a female subject.

1510. A small oval tumour which was removed from the hard palate, together with a portion of the mucous membrane, beneath which it lay loosely encapsuled.

The substance of the tumour is firm and almost homogeneous, traversed imperfectly by irregular clefts, and in one situation lobed on the surface.

Microscopic Structure.—The tumour presents in parts circular and cleft-like spaces, lined or filled with small spheroidal cells, and lying in a scanty hyaline ground-substance. From this structure gradations can be traced to a condition in which the growth is composed almost entirely of large masses of similar spheroidal cells. In these masses small vessels, the walls of which have undergone a hyaline degeneration, are present. The tumour is surrounded by a distinct fibrous capsule. The tumour is probably an endothelioma.

From a woman, aged 48, who was admitted into U. C. H. Aug. 29, 1876. There had been a small lump on the hard palate since childhood, which had been enlarging for 2 years. The tumour, which was unconnected with the bone, was easily enucleated. (Heath, 'Lancet,' 1876, vol. ii, p. 712.)

1511. A papilloma together with part of the uvula from which it was growing. The tumour is irregularly oval in form, about 1·5 cm. in its longer diameter, and extended in the horizontal direction. It is composed of three or more parts, which bear closely-set papillary projections, and are attached to the extremity of the uvula. 3381

Removed by Mr. Liston.

INJURIES AND DISEASES OF THE PHARYNX AND ŒSOPHAGUS.

Foreign Bodies in the Pharynx and Œsophagus.

Foreign bodies most commonly lodge behind the larynx. If they pass this point they may be arrested near the lower end of the œsophagus. A coin or any flat body lies with its surfaces looking backwards and forwards. This fact should be remembered in attempting its removal (1515).

The retention of a foreign body in the œsophagus may occasion ulceration, and this may be followed by septicæmia, suppuration in the surrounding tissues, or hæmorrhage from a neighbouring vessel.

1512. The posterior part of a tongue, with the larynx and lower part of the pharynx. In the lowest part of the pharynx there is impacted a mass of meat, which completely covers the upper opening of the larynx. 3810

From a woman who was found dead in bed, having been seen intoxicated two hours previously. Some meat and crumbs were found beside her. There was no appearance of mechanical injury to the mucous membrane of the pharynx. The pharynx was packed full of meat, about a third of the whole quantity being preserved in the specimen.

1513. A triangular piece of a plate, 3 cm. along its longest side, which was removed from the œsophagus of a boy by Mr. Liston thirty-six hours after it had been impacted. 3688

1514. A flat circular tin whistle, 2·5 cm. in diameter, extracted by Mr. Liston from the œsophagus of a boy 10 years of age. 3687

1515. The lower part of a trachea with the adjoining portion of the œsophagus of a child. A halfpenny is impacted in the œsophagus 2 cm. below the bifurcation of the trachea. The flat surfaces of the halfpenny look directly forwards and backwards. 5344

The child, a boy aged 3 years, was brought to Mr. Stedman, of Great Bookham, in May 1864, with the statement that it had swallowed a halfpenny. There was no discomfort, and the child seemed readily able to swallow food. Subsequently the mother thought there was occasional difficulty of swallowing. This absence of marked symptoms continued till the child suffered from scarlet fever in September of the same year. In recovering from this disease, cough, dyspnœa, and dysphagia came on; and the child became emaciated and died in July 1868. The lungs, after death, were found tuberculous. There was no history of tubercle in the family.

1516. A large piece of meat which became impacted in the lower part of the pharynx.

From a boy, aged 10, who was brought to U. C. H., in May 1886, blue in the face and insensible. Laryngo-tracheotomy was at once performed with a penknife and gave immediate relief. Chloroform was then administered and an examination made, at first without result, but on passing a catheter into the œsophagus a lump was felt, which was pushed down into the stomach. The mass of meat preserved in the specimen was subsequently vomited. The tracheotomy-tube was removed after 48 hours and the patient recovered.

Rupture of the Œsophagus.

Rupture of the œsophagus may result from perforation by a foreign body (1517). It may occur spontaneously during the act of vomiting (1519), or may be caused by gastric digestion shortly preceding death (1520). Or ulcer (7031a)

1517. A larynx, trachea, œsophagus, and heart. There is a perforation in the anterior wall of the œsophagus to the left of the middle line on a level with the bifurcation of the trachea. The perforation is oblique and rather more than 1 cm. in length; the muscular coat is exposed in its edges. A bristle has been passed through the perforation and onwards externally to the left bronchus through a perforation in the upper and back part of the pericardium.

From a man who killed himself whilst performing the trick of sword-swallowing.

1518. The "sword" by which the injuries present in the preceding specimen were produced.

1519. The lower part of an œsophagus, with the cardiac portion of the stomach. The œsophagus has been ruptured close above its lower end for a distance of 4 cm., the rent being exactly longitudinal in direction. At its lowest part the mucous membrane is slightly everted into the aperture. On the left side the mucous membrane of the œsophagus is wanting from near the lower end of the rupture as far as the upper end of the part shown; the edges of that which remains are sharply defined and slightly irregular; it appears, therefore, as if the mucous membrane had been stripped off from the surface noticed. 3658

The rupture was occasioned by violent vomiting; and the diaphragm was also ruptured. After death the contents of the stomach were found in the left pleural cavity, which was much inflamed. The vomiting occurred suddenly after dinner, and in the act the patient fainted; he rallied, and was again attacked with fainting, accompanied with a great desire to vomit, which, however, could not be accomplished. The ordinary symptoms of perforation subsequently set in with great intensity, and in thirteen hours after the onset of the symptoms the patient died. (See C. J. B. Williams, Trans. Path. Soc. 1846-47, vol. i, p. 151.)

1520. Part of the œsophagus, the trachea, heart, and part of the pericardium and diaphragm of a child. In the middle line of the anterior wall of the œsophagus, on a level with the base of the heart, is a perforation marked by a piece of blue glass. The perforation is rounded in outline, about 2 mm. in diameter, and passes obliquely downwards and forwards through the wall of the œsophagus into the right pleural cavity. Immediately below the opening the circular muscular fibres are exposed between two longitudinal bands. 5764

From a child, aged 4 months, who was operated on by Mr. Godlee in U. C. H. for strangulation of the left testicle just outside the external abdominal ring; the testicle sloughed and a few days later was removed; erysipelas supervened and finally septic peritonitis; death occurred 26 days after the second operation. For three or four days before death there had been diarrhœa, and frequent vomiting occurred in the last night but one before death; two hours before death sudden difficulty in breathing occurred, inspiration being accompanied by a whiffing noise. At the *post mortem* examination the left pleura was normal, but the right pleura contained about 1 ounce of clear deeply blood-stained fluid; the right lung was more collapsed than the left and its surface studded with petechiæ; behind the root of the right lung there was a large subpleural hæmorrhage, and in this situation the pleura covering the right side of the œsophagus was absent and bubbles of air could be made to escape from the opening in the œsophagus by pressure; the œsophagus contained several clots. (See Boyd, Trans. Path. Soc. 1882, vol. xxxiii, p. 123.)

1521. Part of an œsophagus, with parts of the stomach, liver, and diaphragm, the thoracic aorta, &c. In the left side of the œsophagus, ending immediately above the cardia, is a longitudinal rent 5 cm. long; at the margin of the opening the mucous membrane ends in a well-defined border, but the muscular coat is irregular. Close to the right border of the opening the submucous tissue is exposed in a furrow between two longitudinal bands. The rupture of the œsophagus opens freely into the left pleural cavity, the parietal pleura around the opening being destroyed and presenting a ragged shreddy margin. There are several small erosions in the mucous membrane of the stomach. 5587

From a woman, aged 18, who was the subject of Addison's disease. For 3 days before death there had been uncontrollable vomiting. At the *post mortem* examination 2 or 3 ounces of blood-stained fluid were found in the left pleural cavity; there was a chronic abscess in the right groin and necrosis of the pubic bone; there was tuberculous disease of both suprarenal bodies. (See Boyd, Trans. Path. Soc. 1882, vol. xxxiii, p. 125.)

This specimen and the preceding one were examined by a committee of the Pathological Society, who regarded the perforations as the result of gastric solution.

Dilatation of the Œsophagus.

No. 1522 illustrates the rare condition in which dilatation of the œsophagus occurs independently of stricture. The cause is uncertain.

1522. An œsophagus, so greatly dilated that in its central part it has a circumference of 12 cm. At the upper and lower ends of the specimen the dilatation gradually diminishes, the upper end of the œsophagus and the cardiac orifice being both normal in size. Throughout nearly the whole length of the œsophagus the normal appearance of the mucous membrane is lost; the natural longitudinal rugæ are replaced by irregular rugæ, whilst above the cardiac orifice the surface is mamillated and velvety. Over a large circular area near the middle of its length the inner surface of the œsophagus is rough, irregular, and discoloured, and presents areas of ulceration in which the whole thickness of the mucous membrane is destroyed. In this area the wall of the œsophagus presents a shallow bulging, bounded along its right side and above and below by a rounded border; on the lower part of this border is an oval clean-cut erosion, near which a layer of exudation has separated from the surface. To the naked eye the muscular coat presents no change. 6934

Microscopic Structure.—The epithelium is hypertrophied; there is fatty degeneration of the muscular coat.

From a woman, aged 35, who was admitted into U. C. H., under the care of Dr. Sidney Martin, Sept. 17, 1892. The duration of the illness was 2 years and 1 month; it commenced with vomiting and pain in the epigastrium; attacks of dyspnœa followed, and towards the end there was cough with muco-purulent expectoration. At the *post mortem* examination the dilated œsophagus was filled with undigested food; it pressed on the pericardium and bulged into the right pleura; there was no stricture. There was broncho-pneumonia with recent pleurisy at the base of the right lung. (Dr. Ringer's *Case-books*, 1892, vol. ii, p. 667.)

Diverticula of the Pharynx and Œsophagus.

Two forms of diverticula may occur in the wall of the œsophagus—traction diverticula and pressure diverticula. The former are usually small. They most commonly occur in the thoracic part of the œsophagus, and result from the shrinking of inflammatory deposits outside the wall of the œsophagus, as, for instance, in connection with a caseous lymphatic gland (1523). Pressure diverticula most commonly arise from the posterior wall of the pharynx at its junction with the œsophagus. These diverticula are probably congenital in origin, but their subsequent increase in size results from repeated distension with food and gas. The sacculus may thus reach such a size as to form a tumour in the neck, usually on the left side, which varies with the degree of distension, and is associated with difficulty in swallowing and the occasional regurgitation of the contents of the sacculus.

In rare instances pouches arise from the pharynx and are believed to result from non-closure of a visceral cleft (1524).

1523. Part of an œsophagus, together with the lower part of the trachea and its bifurcation. In the middle line of the anterior wall of the œsophagus, 3 cm. below the bifurcation of the trachea, is a small pouch-like diverticulum. The opening of the diverticulum is oval in shape and measures about 1 cm. in its longer diameter, and the interior is lined with normal mucous membrane. In the bifurcation of the trachea is part of a small group of deeply pigmented glands containing calcareous matter, and to the lowest gland is adherent the apex of the conical protrusion of the muscular wall of the œsophagus which forms the pouch.

From a man who died in U. C. H. of phthisis. 8673

1524. Portions of the wall of a large sacculus of the pharynx, which was removed by operation. In one of the fragments is the small opening, marked by a piece of glass rod, where the sacculus passed through the thyro-hyoid membrane. The inner surface of the sacculus is irregularly reticulated. 8661

Microscopic Structure.—The wall of the sacculus consists of fibrous tissue lined by several layers of epithelial cells, the innermost of which have a columnar form.

From a man, aged 31, in whom there was a swelling in the side of the neck at the level of the hyoid bone; the tumour was soft and gave a tympanitic percussion note. By pressure the size of the swelling could be reduced, with the production of a squeaking sound. For 3 years the patient had been subject to attacks of painful deglutition attended with the appearance of the swelling in the neck. In the last attack, Dec. 1900, the skin over the swelling became red and the swelling increased considerably in size. On Jan. 2, 1901, the pouch was removed by Mr. Godlee; a narrow pedicle passed through the thyro-hyoid membrane, but the actual communication with the pharynx was not found. The wound healed aseptically. (Godlee and Bucknall, Med. Chir. Trans. vol. lxxxiv, 1901.)

ADENOID VEGETATIONS OF THE PHARYNX.

These result from overgrowth of the lymphoid tissue, which is present in the mucous membrane of the pharynx, most abundantly in young subjects, and is situated chiefly on the back and sides of the pharyngeal wall at the level of the orifices of the Eustachian tubes.

The most important results of the presence of adenoid vegetations are nasal obstruction, obstruction of the Eustachian tubes, and glandular enlargement in the neck. The condition is frequently associated with enlargement of the tonsils.

FIBROUS TUMOUR OF THE PHARYNX.

This growth takes its origin from the roof of the naso-pharynx in the periosteum covering the body of the sphenoid or basilar process of the occipital bone. As it grows it fills the naso-pharynx, pushing forwards the soft palate, and eventually blocking and distending one or both nasal cavities. After removal the tumour may recur from the divided surface of attachment, and although in the first instance a firm fibroma it may become more cellular and more rapidly growing.

1525. An irregularly quadrilateral fibrous tumour, 4·5 cm. in width, to one end of which a flattened process 2 cm. long is attached. The tumour is covered with mucous membrane except on the upper border, where there is a divided surface, which indicates the position of the attachment of the tumour to the base of the skull. A section of the tumour shows a firm homogeneous structure. 6645

Microscopic Structure.—The tumour consists of dense fibrous tissue containing small oval and spindle cells; the vessels appear in the form of cleft-like spaces.

From a boy, aged 16, in whom there had been obstruction to nasal respiration for seven or eight months with frequent bleeding from the throat. On admission the tumour filled the naso-pharynx, pushed the soft palate forwards, and completely blocked both the posterior nares. The tumour was removed, after preliminary laryngotomy, with a wire écraseur, which was introduced through the right nostril and adjusted around the base of the tumour with a finger in the mouth. The patient left the hospital on the 25th day. (Surg. Reg. Rep. 1890, p. 61.)

ULCERATION OF THE PHARYNX AND ŒSOPHAGUS.

Syphilitic ulceration of the pharynx is common, and tuberculous ulceration is occasionally met with. All forms of ulceration, except that due to malignant disease, are very rare in the œsophagus.

1526. A tongue, with the soft palate, larynx, and parts of the pharynx and œsophagus, the œsophagus being greatly narrowed immediately below the cricoid cartilage. Ulceration extends upwards on each side over the posterior surface of the cricoid, and the surface of the narrowed part is also superficially ulcerated. On the left side a piece of bougie is seen projecting from a sinus, which opens into the pharynx immediately above the stricture; the mucous membrane of this part of the pharynx is ulcerated. The bougie passes by the side of the trachea and through an ulcerated aperture in the sterno-thyroid muscle. The cartilages of the larynx on the left side are bare and necrosed.

Microscopic Structure.—There is no evidence of new growth. The nature of the ulceration is doubtful.

From a woman, aged 45, who was admitted into U. C. H., under the care of Mr. Liston, October 1846. The patient stated that she first noticed difficulty of swallowing about fifteen months previously after an attack of cold; the difficulty increased, and within ten months she was entirely unable to take solid food. Three days before her admission, Mr. Liston introduced an elastic catheter (as he had done for some time with advantage) apparently through the strictured part, but the operation gave her some pain. Pain and swelling of the front of the throat, with increased difficulty of swallowing, followed, and an abscess formed, for which she was taken into the hospital. The abscess was opened, but the patient died on the 12th of November.

After death an abscess was found beneath the sterno-mastoid and sterno-hyoid muscles of each side, and from the abscess a track extended through the sterno-thyroid muscle to the pharynx above the stricture.

SIMPLE STRICTURE OF THE ŒSOPHAGUS.

This is almost invariably due to the cicatrisation following the swallowing of corrosive fluids. It may arise from a scald. Stricture of the œsophagus following any other form of ulceration, except that due to malignant disease, is extremely rare. The stricture is usually situated near the upper part of the œsophagus, and above it the tube is dilated and the muscular coat hypertrophied.

Congenital narrowing of the œsophagus is occasionally met with.

1527. A larynx and trachea with the lower part of the pharynx and corresponding portion of the œsophagus. About 3 cm. below the lower border of the cricoid cartilage the canal of the œsophagus is reduced in size, so as to admit only a No. 6 catheter. Both the mucous membrane and the muscular tissue of the œsophagus at the seat of stricture, as well as above and below it, are healthy, but the inferior constrictor of the pharynx is hypertrophied; the upper cornua of the thyroid cartilage are approximated so as to leave an interval of only 1·5 cm. between them. 3657

From a patient between 70 and 80 years of age, in whom the stricture had existed for many years.

Carcinoma of the Œsophagus.—Malignant Stricture.

Carcinoma may involve any part of the œsophagus, but is most common at the upper (1531) and lower extremities (1543), and at about the middle of its length in the neighbourhood of the bifurcation of the trachea (1540). Except at the lower end, where the tumour may be a spheroidal-cell or columnar-cell carcinoma, the tumour is always of the squamous-cell variety. The growth tends to spread around the whole circumference of the œsophagus, sometimes involving a considerable length, and usually presents an irregular ulcerated surface with thickened and everted edges (1542). In some instances a carcinoma involving the wall of the œsophagus may cause a tight annular stricture with very little naked-eye evidence of new growth (1534). The dilatation of the œsophagus above a malignant stricture is usually but little marked (1534). The ulcerating growth may involve neighbouring parts. Thus the trachea or one of the bronchi is frequently opened by the disease, and deglutition becomes almost impossible on account of the irritation occasioned by food entering the air-passages, and death may be caused by septic pneumonia (1538, 1539). In other cases the pleura is opened or profuse hæmorrhage may occur from ulceration into a large vessel. The disease may also give rise to the formation of abscesses in the mediastinum or neck (1529). The lymphatic glands in the neighbourhood are frequently enlarged (1537).

1528. The left half of a tongue, pharynx, larynx, and œsophagus, showing an irregularly lobulated growth on the lateral wall of the pharynx immediately external to the left ary-epiglottic fold. The vertical measurement of the projecting part of the growth is 3 cm., and it considerably overhangs its base of attachment. From the outer surface of the ary-epiglottic fold a secondary fold has been drawn outwards by the traction of the tumour. The ary-epiglottic fold is so much pushed inwards by the tumour as considerably to encroach on the upper aperture of the larynx. From the lower border of the projecting part of the tumour a flat warty extension is continued downwards to the level of the upper border of the cricoid cartilage. 4222

1529. A larynx and trachea, together with part of the pharynx and œsophagus, showing two carcinomatous growths, one in the pharynx and the other in the œsophagus. The upper growth involves chiefly the right ary-epiglottic fold and the adjacent part of the lateral wall of the pharynx; it forms a slightly lobulated growth with a finely reticulated surface, and projects so much inwards as very seriously to obstruct the upper aperture of the larynx; posteriorly the growth extends across the middle line into the posterior part of the left ary-epiglottic fold. The second growth forms an oval ulcerated surface 6·5 cm. in length, the upper limit of which is 4 cm. below the lower border of the cricoid cartilage. This growth involves nearly the whole of the circumference of the œsophagus, and especially at the upper end presents a prominent raised and everted border. Externally the tumour forms a considerable mass, which is firmly adherent to the left side of the trachea, the interior of which, however, presents a normal appearance. 7812

Microscopic Structure.—Both the tumours have the structure of squamous carcinoma.

From a man, aged 63, who died in Colney Hatch Asylum in April 1897 after having been insane 2½ years. About 7 months before death a growth developed on the right side of the neck, and there were indications of œsophageal obstruction, which followed a very definite history of a fish-bone having been swallowed. The growth in the neck increased in size, and death was preceded by emaciation, with difficulty in breathing and swallowing. Besides the growths in the pharynx and œsophagus, there was a large deposit in the lymphatic glands on the right side of the neck, and a large abscess on the left side of the neck, from which several attacks of hæmorrhage had occurred during the last few weeks of life. The specimen is possibly one of direct auto-infection. (See Beadles, Trans. Path. Soc. 1897, vol. xlviii, p. 68.)

1530. A tongue, with the larynx and trachea and part of the pharynx and œsophagus. The anterior wall of the pharynx and the upper part of the œsophagus are involved in a new growth, which extends from the ary-epiglottic folds downwards for a distance of 7 cm. In its upper part the growth covers the posterior surface of the cricoid cartilage, and is continued upwards into the ary-epiglottic folds, without encroaching upon the aperture of the larynx. Below the level of the cricoid the growth is ulcerated, and involves the whole circumference of the œsophagus, considerably narrowing the tube, and ending below in a raised slightly everted border. The right lobe of the thyroid body is enlarged and cystic. 3751

Microscopic Structure.—The tumour is a squamous carcinoma.

1531. A larynx with parts of the trachea, pharynx, and œsophagus. The lower part of the pharynx and the adjacent part of the œsophagus are for a distance of 6 cm. completely surrounded by a carcinomatous growth. Superiorly the growth projects upwards, involving the outer surface of the right ary-epiglottic fold, and pushes both folds forwards into contact with the epiglottis, so as almost completely to occlude the aperture of the larynx. In this part of its extent the tumour presents a distinctly papillomatous surface, but elsewhere the surface is irregularly nodular and ulcerated. The edges of the ulcer are everywhere well-defined, and inferiorly a projecting lobule of the growth considerably overhangs the healthy mucous membrane. 8464

Microscopic Structure.—The growth is a squamous carcinoma with very well-marked cell-nests.

From a woman, aged 51, in whom there was a family-history of cancer. For several years she had suffered with "bad throats," for which she had been in the habit of using strong caustics. The chief symptom was dysphagia; there were hardly any symptoms of laryngeal obstruction. Death occurred from inanition.

Presented by Dr. Clark Watson.

1532. A tongue, together with the larynx and parts of the trachea, pharynx, and œsophagus. The mucous membrane of the highest part of the œsophagus and lower part of the pharynx, as far as the upper border of the cricoid cartilage, is the seat of an ulcerated growth. At the lower part of the growth the œsophagus is greatly narrowed and its walls are infiltrated, so as no longer to present a distinction between its several coats. The upper and lower margins of the ulcerated surface are slightly raised and everted. Immediately below the ulcer the mucous membrane is unaltered in appearance, and the fibres of the muscular coat are separate and distinguishable. On the left side of the strictured portion of the œsophagus, and reaching for some distance below it, is a cavity formed apparently in the soft tissues around the œsophagus, which communicates above with its interior. 4578

Microscopic Structure.—The tumour is a squamous carcinoma.

From a woman, aged 33, admitted under Sir J. Erichsen's care, January 1859. The patient's ailment commenced, nearly four years previously, with slight soreness of the throat. In December 1858 considerable difficulty in swallowing fluids came on, and by the end of that month she was unable to swallow either solids or liquids, the latter being ejected by the nose or mouth almost immediately after being taken. On admission nothing larger than a No. 6 gum-elastic catheter could be passed through the stricture. The stricture appeared to be on a level with the cricoid cartilage; there was no external swelling. Fluid food was injected regularly into the stomach by a catheter; but about three weeks before her death (February 6, 1859) it became impossible to pass any instrument, and nutrient enemata were given.

1533. Portion of a tongue, pharynx, and œsophagus, with the larynx and trachea. In the posterior wall of the upper part of the œsophagus, immediately below the cricoid cartilage, a flattened tumour has grown. The growth extends over about 4 cm. of the length of the œsophagus, within which it projects so as to cause considerable narrowing; the tumour is about 1 cm. in thickness; the mucous membrane has been removed from its right side by ulceration. The divided surface of the growth has an open reticular texture, the meshes of which contain a softer homogeneous substance.

Microscopic Structure.—The tumour is a squamous carcinoma.

From a man, aged 68, whose general health had been good and habits temperate. About seven months before death he felt pain near the hyoid bone in swallowing, and since that time had experienced constant pain in the right side of the head. Dysphagia supervened, and for some time before death fluids could be swallowed only with the greatest difficulty. One of the cervical glands on the left side commenced to swell soon after deglutition was impaired. (Mr. Quain's *Case-book*, Males, Jan. 1860.)

1534. The lower 18 cm. of an œsophagus, with the cardiac end of the stomach. At a distance of 8 cm. above its lower end the canal is the seat of a marked annular constriction. Above the stricture the muscular coat is hypertrophied, and the inner surface presents an abnormal longitudinal puckering. At the seat of stricture the whole thickness of the wall of the œsophagus is infiltrated by opaque solid growth, and the muscular fibres are not recognisable. In part of its extent the inner surface of the stricture is ulcerated, the edges of the ulcer being thickened by the new growth. Below the stricture the œsophagus is normal. 5277

Microscopic Structure.—The growth is a carcinoma.

1535. A tongue with the larynx and trachea, and the pharynx and greater part of the œsophagus. The walls of the œsophagus, opposite the bifurcation of the trachea, have been extensively destroyed by the ulceration of a carcinomatous growth. The anterior wall of the œsophagus has been completely destroyed over an irregular area about 3 cm. in length; and the growth has invaded the posterior wall of the trachea, which has been perforated by ulceration immediately above its bifurcation, and a little to the left of the middle line. The mucous membrane of the œsophagus has been extensively undermined by the ulceration of the growth, and hangs in large pieces over it. The growth has extended very irregularly downwards, and on the right side of the œsophagus an incision has been made into a nodule situated beneath the mucous membrane, and apparently isolated from the rest of the tumour. The ulcerated surface of the growth is shreddy, and the tumour appears to be formed by a delicate reticulum of connective tissue supporting a softer cell-material. The disease has invaded the lymphatic glands lying along the side of the œsophagus. 4837

1536. A larynx and trachea, with part of the pharynx and œsophagus. The mucous membrane of the œsophagus and lowest part of the pharynx is extensively ulcerated on the left side over a distance of about 5 cm., the exposed submucous tissue projecting in shreds from the ulcerated surface. At its lowest part the ulceration has destroyed the entire thickness of the œsophagus, which is here perforated. The submucous tissue over the back of the cricoid and arytenoid cartilages is very œdematous. 4069

Microscopic Structure.—The base of the ulcer presents the structure of squamous carcinoma.

The patient died with all the symptoms of stricture of the œsophagus (although no narrowing has resulted from the disease); he was quite unable to swallow, and no bougie could be passed beyond the situation of the lower of the ulcers, on account of the pain and spasm produced.

1537. A tongue, together with the larynx and trachea and part of the pharynx and œsophagus. Involving the whole circumference of the œsophagus for a length of 4 cm., and extending upwards to a distance of 4 cm. below the cricoid cartilage, is an ulcerated infiltrating tumour with an irregular warty or nodular surface, and causing marked constriction of the lumen. In the mucous membrane of the œsophagus, for a distance of 4 cm. below the ulcer, are several isolated nodules of growth, some of which take the course of the longitudinal folds. These nodules are about 6 mm. in diameter; some are ulcerated and others are covered with mucous membrane. Occupying the interval between the œsophagus and the trachea on the right side of the neck, and extending from the thyroid body nearly as far as the bifurcation of the trachea, is a large irregular mass of growth in the lymphatic glands. At its upper part this mass projects into the right side of the œsophagus, immediately above the growth in the latter, in the form of a smooth oval prominence covered with mucous membrane, and considerably obstructing the lumen of the tube. On the left side there is a chain of diseased, but much less enlarged, glands in the corresponding position. The œsophageal growth projects into the trachea at about the middle of its length in the form of an ovoid mass nearly 2 cm. in length, and apparently covered with mucous membrane, whilst above this projecting nodule the mucous membrane of the posterior wall of the trachea is slightly raised. The edges of a tracheotomy opening are seen above the isthmus of the thyroid body. 6313

Microscopic Structure.—The tumour is a carcinoma composed of large masses of small spheroidal or irregular cells, with no tendency to the formation of cell-nests.

1538. A tongue with the larynx and trachea and parts of the pharynx and œsophagus. At its upper part, for a length of 6 cm., the wall of the œsophagus is extensively destroyed in its whole circumference by the ulceration of a new growth which has infiltrated its walls. At its lower part the growth extends downwards in the mucous membrane of the anterior wall of the œsophagus, which is raised, undermined, and irregularly perforated by ulceration. Close to the lowest part of the growth there is a separate nodule in the mucous membrane. At its centre the ulceration of the tumour has completely destroyed the anterior wall of the œsophagus and the posterior wall of the trachea. The opening in the latter measures nearly 2 cm. vertically, and above and below the opening the mucous membrane of the trachea is irregularly raised by the extension of the new growth into it. There are secondary deposits of the growth in the lymphatic glands lying between the trachea and œsophagus on both sides and in the glands below the bifurcation of the trachea. 6346

From a man, aged 47, who was admitted into U. C. H., under the care of Mr. Hill, in April 1888, with a history of gradually increasing difficulty of swallowing for 3 months. On admission there was considerable difficulty of breathing; an œsophageal tube could be passed into the stomach, and with this the patient was fed. On the fourth day tracheotomy was performed above the thyroid body, without much relief. Death occurred two days later from broncho-pneumonia. (Surg. Reg. Rep. 1888, p. 47, No. 625.)

1539. Part of an œsophagus, together with the lower part of the trachea and the bronchi. For a length of 9 cm. the œsophagus is involved in its whole circumference by an extensively ulcerated new growth which invades the whole thickness of the wall. The centre of the growth is on a level with the bifurcation of the trachea, and a small communication has been established between the œsophagus and the right bronchus immediately below the bifurcation. On the right side the growth extends through the wall of the œsophagus, and is beginning to invade the root of the lung; below the latter is an enlarged pigmented gland, in which are two separate deposits of new growth. A separate nodule of growth projects on the surface of the pericardium in the lowest part of the specimen. 6480 A

1540. The lower part of a trachea, with the adjoining portion of the œsophagus. Opposite the bifurcation of the trachea the walls of the œsophagus have been extensively destroyed by an ulcerating growth; a narrow strip of mucous membrane on the left side remains entire. The ulcer extends over about 5 cm. of the length of the œsophagus, and is deep and irregular; the deepest part of the depression corresponds with a projection of the growth within the left bronchus. The surface of the ulcer in the œsophagus is very uneven, fissured, and shreddy; the edges of the mucous membrane are slightly everted; over the ulcer the œsophagus is firmly adherent to the trachea, aorta, and lung. 2089

1541. A larynx and trachea, with parts of the pharynx and œsophagus. The wall of the œsophagus for a length of about 10 cm. is completely wanting for about half its circumference, in consequence of its destruction by the growth of an ulcerating tumour in its walls. The upper limit of the ulceration is opposite the bifurcation of the trachea. The œsophagus below the ulceration appears healthy; the mucous membrane of that above is ulcerated, the submucous tissue being exposed about 4 cm. from the upper limit of the disease. Above this is a longitudinal depression, around which the mucous membrane is uneven and puckered, the depression having resulted apparently from the healing of the upper part of the ulcer shown; beneath this spot is a large swelling formed by diseased lymphatic glands. Over its central part the growth has infiltrated the several layers of the wall of the œsophagus, which, however, are traceable for some way upon its upper and lower parts. The inner surface of the growth is very ragged and spongy, and the surrounding mucous membrane extensively undermined. Outside the upper part of the œsophagus is an oval mass about 4 cm. long, formed by a group of lymphatic glands lying along the right side of and behind the trachea, which have become the seat of secondary growth. Lower down some pigmented glands by the right side of the trachea appear also to have been affected by the disease. 1826

1542. The lowest 10 cm. of an œsophagus, with the cardiac portion of the stomach, the œsophagus being the seat of a carcinoma. The parts have been divided through the growth, which is somewhat fusiform; it measures 7 cm. in length, and involves the whole circumference of the œsophagus, with the exception of a strip of healthy-looking mucous membrane less than 1 cm. in width. The surface of the growth is irregular and ulcerated, and its raised edge is in parts considerably everted.

Microscopic Structure.—The tumour is probably a squamous-cell carcinoma, but the condition of the specimen renders the microscopic examination unsatisfactory.

From a man, aged 56, who was admitted into U. C. H., under the care of Dr. Walsh, August 9, 1848, with a history of pain at the ensiform cartilage, during swallowing, of one year's duration, and difficulty in swallowing, with frequent regurgitation, for 3 months. Death occurred from inanition on August 20. (Dr. Walsh's *Case-books*, 1848, Males, No. 4, p. 81.)

1543. A stomach, together with the lower part of the œsophagus and part of the abdominal wall, showing an opening into the stomach made in the operation of gastrostomy. In its lowest 5 cm. the œsophagus is narrowed by a carcinoma, which has invaded nearly the whole thickness of its wall, and is extensively ulcerated on the inner surface. The stomach is moderately contracted, and the gastrostomy opening is situated about midway between the two curvatures, near the pyloric extremity of the anterior surface. 7351

Microscopic Structure.—The growth is a squamous carcinoma.

From a woman, aged 51, who was admitted into U. C. H., under the care of Mr. Barker, Jan. 19, 1895, on account of emaciation, epigastric pain, and regurgitation of food, of six months' duration. Bougies could not be passed into the stomach. Gastrostomy was performed, and on introducing the finger into the stomach a very dense growth was felt obstructing the cardiac orifice. Attempts were made to pass catheters into the œsophagus, but failed. The patient died the day after the operation. (Mr. Barker's *Case-books*, 1895, vol. i, p. 340.)

INJURIES OF THE ABDOMINAL WALL.

Rupture of the muscles of the abdominal wall may be followed by hernia. Penetrating wounds of the abdominal wall may be complicated by injury to the viscera or by prolapse of omentum or intestine into the opening (1545).

1544. An oval piece of skin from the abdominal wall, at the lower end of which is the umbilicus. About 4 cm. above the umbilicus is a small crucial wound, situated exactly in the middle line. The transverse limbs of the cross together measure nearly 2 cm.; the vertical limbs are about half this length. On the other side of the specimen is a large piece of omentum, the folds of which are somewhat matted together. A small piece of this has prolapsed into the internal orifice of the wound and is firmly adherent to it. 2370

1545. A portion of the abdominal wall above and to the left of the pubes. There is an incised wound penetrating to the abdominal cavity; it measures 6 cm. in length and is transverse in direction. About its middle is a small vertical wound about 5 mm. in length. On the opposite side of the specimen is a coil of the ileum, a knuckle of which has passed through the inner opening, which is 2·5 cm. in diameter and circular in outline. The gut lies between the fat and the aponeurosis of the external oblique; it is not strangulated. There is a small punctured wound on each side of the piece of gut. 2302

It is described in the old Catalogue as a bayonet-wound. The gut was wounded and incarcerated. The external wound was probably lengthened after death. The internal opening has been stretched by the protruded gut.

INJURIES OF AND OPERATIONS ON THE STOMACH.

Injuries of the Stomach.

The stomach may be ruptured by a severe contusion of the abdomen or wounded by a stab or bullet. Rupture following contusion may involve the whole thickness of the stomach wall or a part only, such as the mucous membrane (1546).

Foreign bodies which have been swallowed may perforate the stomach wall.

1546. A stomach completely everted in order to expose an extensive rupture of the mucous membrane. The rupture crosses the small curvature near the cardiac orifice, extends across the anterior surface nearly as far as the great curvature, and across the posterior surface to a less extent. On both surfaces the main rupture is joined by a secondary one which passes downwards, and in which a large surface of the submucous tissue is exposed by the tearing of the mucous membrane. Around part of the rupture, especially on the anterior surface, the mucous membrane is discoloured by extravasated blood. 8321

From a boy, aged 12, who was run over.

Operations on the Stomach.

The specimens preserved in this section illustrate some of the operations which are practised upon the stomach. The diseases of the stomach are illustrated in the Medical Series.

Nos. 1547, 1548 illustrate the operation of *suture for perforated gastric ulcer*, death resulting in the one case from shock, in the other from peritonitis.

Nos. 1550–1553 illustrate the operation of *gastro-enterostomy* for obstruction of the pylorus. In Nos. 1550, 1551 a communication has been established between the anterior surface of the stomach and a loop of the jejunum; in Nos. 1552, 1553 the small intestine has been brought into communication with the posterior surface of the stomach through an opening in the transverse mesocolon.

Nos. 1554, 1555 illustrate the operation of *pylorectomy* for carcinoma. This operation is most usually combined with gastro-enterostomy, the divided ends of the stomach and duodenum being independently closed (1557).

Nos. 1558, 1559 illustrate the removal of a tumour of the stomach by excision of part of the wall, with closure of the opening.

No. 1543 illustrates *gastrostomy* for stricture of the œsophagus.

1547. A stomach in which a perforated ulcer has been closed by suture, laid open along the great curvature. Externally the horizontal line of sutures lies between the attachments of the small and great omenta, which are closely approximated as the result of the infolding of the anterior wall of the stomach produced by the suturing, and probably in part by inflammatory thickening around the ulcer. On the inner aspect is seen the ulcer, which is situated on a horizontal elevation caused by the infolding of the stomach wall. 7508

From a woman, aged 23, who was admitted into U. C. H., under the care of Mr. Barker, in 1896. For some years she had been subject to attacks of pain and vomiting after food. On admission in one of these attacks she was collapsed; pulse 160, small; respirations 60, chiefly costal; abdominal wall rigid and liver dulness absent; pain was referred to the hypogastrium. Operation was performed 4½ hours after the onset, and on opening the abdomen above the umbilicus gas and fluid escaped. The perforation was found by dividing some adhesions passing from the stomach to the abdominal wall and liver, and was closed by two rows of silk sutures. The peritoneum was cleaned by sponging, a gauze drain placed in the wound, and a drainage-tube introduced through an incision in the left flank. Death occurred from shock in 4 hours. (Surg. Reg. Rep. 1896, p. 22, No. 81.)

1548, 1549. A stomach divided along the curvatures. At about the middle of the anterior surface is an irregular ulcer, which perforated and was closed by suture. The line of the sutures measures 6 cm. in length, and the infolding of the stomach wall caused by the suturing has produced a marked contraction of the middle of the stomach and a prominent oblique ridge on its inner surface. In the pyloric half of the posterior surface of the stomach are two other rounded ulcers, the larger of which is 6 mm. in diameter; the base of the ulcers is quite translucent and formed by little more than peritoneum. Close to the larger ulcer is another, which has healed and is surrounded by a radiate puckering of the mucous membrane. In its whole extent the mucous membrane is thickened and presents in parts a mamillated surface. The peritoneal surface of the front of the stomach is in parts coated with recent inflammatory exudation. 7679

From a woman, aged 25, in whom there was a history of dyspepsia of one year's duration. At 5.30 P.M. on Oct. 25th, 1896, she was suddenly seized with severe abdominal pain 4 hours after a meal. At 7.30 P.M. the patient was admitted into U. C. H., under Mr. Barker; she was pale, collapsed, and rather cold; there was slight distension of the abdomen, with tenderness over the upper part, and the liver dulness was absent in front. At 9 P.M. the abdomen was opened in the middle line above the umbilicus; gas and turbid fluid escaped; a perforation on the anterior surface of the stomach was closed by two rows of sutures; the peritoneal cavity was cleaned by sponging; iodoform gauze drains were introduced at the middle of the incision. Three hours after the operation the temperature rose to 105° and death occurred shortly afterwards. (Surg. Reg. Rep. 1896, p. 116.)

1550. Part of a stomach, together with a loop of the jejunum, which has been brought into communication with the stomach by the operation of anterior gastro-enterostomy. The pylorus was obstructed by a carcinomatous growth, which appears as an ulcer 4 cm. in its greatest diameter. The coil of the jejunum is firmly united to the anterior surface of the stomach close to the middle of the great curvature. The opening between the stomach and the intestine, as seen from the interior of the latter, is elliptical in shape and measures 1·5 cm. in its longer diameter. On the posterior surface of the stomach in the pyloric half, and close to the small curvature, is an oval ulcer with sharply defined edges, measuring 1·5 cm. in its greatest diameter. On the anterior surface of the stomach in the cardiac portion is another simple ulcer 1 cm. in diameter, and presenting in its centre the open mouth of a small artery. 7924

From a woman, aged 47, who was under the care of Mr. Barker in U. C. H. in 1897. There was a history of indigestion for 7 years, the symptoms being abdominal pain after food, constipation, and vomiting. A lump in the epigastrium was noticed 18 months before admission. Anterior gastro-enterostomy was performed on Nov. 4 by the use of continuous sutures. The patient progressed well until Nov. 23, when she had a rigor with a temperature of 103°. On Nov. 25 a second rigor occurred, and on Nov. 26 there was severe hæmatemesis, which continued in smaller quantities until the next day, when the patient died. (B. M. J. 1898, vol. i, p. 421, Case v.)

1551. Part of a stomach together with the duodenum and part of the jejunum. The latter, at a point 32 cm. from the pylorus, has been united by a Murphy's button to the anterior wall of the stomach close to the great curvature, 7 cm. from the pylorus. The intestine is so placed that the efferent part leaves the stomach in a direction from left to right. The apposition produced by the button is perfect, but the only evidence of commencing union is a slight deposit of exudation around the surfaces of the stomach and intestine which are in contact. The pylorus is tightly strictured by a dense annular infiltrating growth. 7453

From a man, aged 39, who was under the care of Dr. Ringer in U. C. H. in 1895. There had been wasting and loss of appetite for about 2 months, followed by vomiting and pain after food. There was considerable dilatation of the stomach, and a small tumour could be felt to the right of, and a little below, the umbilicus. On Nov. 4 anterior gastro-enterostomy was performed by Mr. Barker with a Murphy's button. The patient died two days after the operation of asthenia. There were numerous secondary deposits of growth in the glands. (B. M. J. 1898, vol. i, p. 421, Case iv.)

1552. A stomach, the anterior wall of which has been removed, together with the duodenum and part of the jejunum and a short piece of the transverse colon with the corresponding part of the mesocolon. The jejunum, at a point 31 cm. from the pylorus, has been brought into communication with the posterior wall of the stomach, through the transverse mesocolon, at a point about midway between the two curvatures and 6 cm. from the pylorus; the two are firmly united. The opening between the stomach and jejunum, after distension, measures 1·5 cm. in diameter. The pylorus is extremely narrowed by an annular infiltrating growth 4 cm. in length. The stomach is slightly dilated and its mucous membrane thickened and in parts mamillated. 8177

From a man, aged 29, who was admitted into U. C. H., under the care of Dr. Ringer, Nov. 14, 1898, on account of abdominal pain and sickness after food of nearly 10 months' duration. On admission the patient was wasted; there was flatulence with frequent "coffee-grounds" vomiting; an ill-defined tumour could be felt above the umbilicus on the left of the middle line; the capacity of the stomach was over 5 pints. On Dec. 22 Mr. Barker performed posterior gastro-enterostomy with a Murphy's button; there was a hard growth at the pylorus. Death occurred from general peritonitis on Jan. 2, 1899. At the *post mortem* examination the button was found in the stomach; there was no leakage at the seat of the anastomosis; there was a dusky congested patch in the wall of the transverse colon where it had lain in contact with the button. (Mr. Barker's *Case-books*, 1899, vol. i, p. 184.)

1553. A greatly enlarged stomach presenting an extreme degree of hour-glass contraction, together with part of the transverse colon and the upper part of the small intestine, which has been brought into communication with the posterior surface of the lower compartment of the stomach near the great curvature by the operation of posterior gastro-enterostomy. Of the two compartments into which the stomach is divided the lower is considerably the larger, and in both the mucous membrane is thickened and the muscular coat, especially in the lower compartment, considerably hypertrophied. The constriction between the two compartments measures 12 mm. in diameter, and in its proximal side is a small ulcer which has perforated the wall of the stomach and leads into a small circumscribed abscess-cavity in the small omentum. The pyloric aperture measures only 6 mm. in diameter, and in the duodenum immediately beyond the pylorus is a perforation leading into an external abscess-cavity surrounded by cicatricial tissue, to which the transverse colon is adherent. The small intestine has been brought up to the posterior wall of the stomach through an opening made in the transverse mesocolon, and the edges of the openings in the two viscera are in good apposition. 8498

From a domestic servant, aged 25, who was admitted into U. C. H., under the care of Dr. Martin, with a history of indigestion of 10 years' duration, and of severe pain and occasional vomiting after food for 5 years. No tumour could be felt in the abdomen, but there were well-marked signs of dilatation of the stomach, with visible peristalsis. The case was regarded as one of pyloric obstruction due to the cicatrisation of an ulcer. After other methods of treatment had failed, gastro-enterostomy by Von Häcker's method was performed by Mr. Pollard on April 27, 1900. The pylorus was found to be involved in an indurated mass, but the presence of the hour-glass constriction was not ascertained. Vomiting persisted after the operation; death occurred on the 5th day. (Martin & Pollard, B. M. J., 1900, vol. ii, p. 1635.)

1554. A pylorus, together with the adjacent parts of the stomach and duodenum, removed by operation for carcinoma. The growth completely surrounds the pylorus, causing marked contraction of the aperture. 8216

From a woman, aged 55, who was admitted into U. C. H., under the care of Mr. Barker, March 11, 1899, with a history of several attacks of abdominal pain during the preceding 14 months, and of vomiting and increased pain for 7 weeks. On admission the patient was anæmic, but fairly nourished; a hard rounded tumour was felt below the left costal margin. On March 16, under local anæsthesia by infiltration with eucaine, posterior gastro-enterostomy was performed with a Murphy's button; a tumour involved the pylorus. The patient's progress was satisfactory and the button was passed *per rectum* on April 3. On April 20 the abdomen was again opened and the pylorus excised, the stomach and duodenum being separately closed with two rows of continuous suture. The patient left the hospital on May 27. (Mr. Barker's *Case-books*, 1899, vol. i, p. 189.)

1555. A pylorus, together with the adjacent parts of the stomach and duodenum, removed by operation for carcinoma. The growth completely surrounds the pylorus, causing great contraction of the lumen, and extends in the wall of the adjacent part of the stomach for a distance of 8 cm. The growth is most extensive in the anterior part of the stomach wall, where it forms a large nodular mass having a thickness at its centre of 2 cm. The divided surface of the stomach and duodenum appears at all parts to be healthy, and in the section which has been made through the specimen the muscular coat of the stomach can be readily traced in the deep surface of the growth. 8328

1556. The stomach and part of the duodenum from the same case as the preceding specimen. The edges of the divided stomach wall have been brought together by a continuous suture of silk (A to A). The divided end of the duodenum has been approximated to a separate incision in the stomach by a continuous circular suture (B to B). At the posterior part of this junction the union is imperfect at the point indicated by a glass rod. The peritoneal surface of the stomach is coated with a thin layer of inflammatory exudation. 8334

From a man, aged 33, who had suffered for 7 months from vomiting, often of "coffee-grounds" material, with epigastric pain, worse after meals, and relieved by vomiting. On Oct. 12, 1899, the abdomen was opened and the pylorus found to be infiltrated extensively by new growth. Pylorectomy was performed; the opening in the stomach was closed by continuous sutures, and the divided end of the duodenum was anastomosed with an opening made in the posterior surface of the stomach by simple suturing. Death followed on the 5th day from peritonitis. (Mr. Barker's *Case-books*, 1899, vol. i, p. 209.)

1557. Part of a stomach, together with part of the small intestine, from a case in which pylorectomy and posterior gastro-enterostomy had been performed. The stomach and small intestine, where divided in the excision of the tumour of the pylorus, have firmly healed. The scar in the stomach is scarcely perceptible on the inner surface, and externally firm adhesions have formed between the stomach and the transverse colon. The closed end of the duodenum is adherent to the posterior surface of the stomach. The communication which has been established between the small intestine and the posterior wall of the stomach near the large curvature appears as an elliptical opening 4·5 cm. in length. 8495

1558. A globular cauliflower-like tumour, measuring 6 cm. in diameter, removed by operation from the posterior wall of a stomach in the region of the pylorus. On the deep surface of the tumour the divided edge of the mucous membrane can be traced, forming an irregular circle 4 cm. in diameter, on which is a somewhat smaller area including the whole thickness of the stomach wall. 8710

Microscopic Structure.—The tumour consists of delicate branching processes covered with columnar epithelium and at one spot in its deeper part of tubular spaces lined with columnar epithelium. There is no definite evidence of infiltration of the base of the tumour.

1559. The stomach from which the tumour preserved in the preceding specimen had been removed, together with a loop of the small intestine, which had been brought into communication with the stomach by the operation of posterior gastro-enterostomy. The scar in the anterior wall of the stomach, resulting from the previous operation, is indicated externally by a layer of adherent fibrous tissue, which terminates below in the great omentum at a point opposite that at which the small intestine has been sutured to the posterior wall of the stomach. Internally the position of the incision is marked merely by a raised thickening in the mucous membrane. Completely surrounding the pylorus is an irregular ulcer of the mucous membrane, the edges of which are in parts prominently raised and overhanging. 8732

Microscopic Structure.—Sections of the thickened edge of the ulcer show spaces containing small spheroidal epithelial cells in the muscular layers of the stomach wall.

From a woman, aged 68, who was admitted into the Worthing Infirmary, under the care of Dr. Frank Hinds, in January 1897, complaining of wasting, painful gripings in the stomach, and frequent irregular action of the bowels. A freely movable hard tumour could be felt in the epigastric region. The abdomen was opened in the middle line and the tumour found to be within the stomach; the latter was opened and the tumour, which was attached to the posterior wall involving the pyloric opening, was removed by dividing the wall of the stomach around its base. The opening in the posterior wall of the stomach was closed with sutures introduced from within, whilst the anterior incision in the stomach, after being partially closed, was stitched up to the edges of the incision in the abdominal wall. Three weeks later the anterior opening in the stomach was closed. For 12 months the patient was able to work and gained flesh. Wasting, sickness, and flatulence then occurred, and posterior gastro-enterostomy was performed 18 months after the first operation. Death occurred from exhaustion in 48 hours. At the *post mortem* examination there was no evidence of peritonitis.

INJURIES OF AND OPERATIONS UPON THE LIVER, GALL-BLADDER, AND BILE-DUCTS.

The liver may be ruptured by a severe abdominal contusion (1560, 1561) or wounded by a stab or bullet; in either case profuse hæmorrhage may occur. Rupture of the liver without external wound has occasionally been followed by fatal peritonitis.

Operations upon the liver itself are concerned chiefly with the treatment of hydatids (1566) and abscess (1567, 1568); in the treatment of the latter, failure is most frequently due to the presence of multiple abscesses.

The diseases of the gall-bladder and bile-ducts are illustrated in the Medical Series. Among the specimens in the following series are gall-stones removed by operation from the gall-bladder (1575), cystic duct (1571), and common bile-duct (1573, 1574), and gall-bladders removed by operation (1570, 1572).

1560. The greater part of the right lobe of a liver, which has been very extensively ruptured vertically, the rupture reaching below nearly to the margin. Numerous secondary fissures extend irregularly into the liver-substance from both sides of the main rupture; and in some places the capsule is stripped from the surface of the liver at the edges of the tear. Numerous large torn vessels cross from one side of the rupture to the other. 2294

From a man who was crushed to death between a boat and the wall of a canal.

1561. The right lobe of a child's liver, lacerated on the under surface close to the right border. The laceration is superficial and measures 5 cm. in length. 6866

A girl, aged 9 years, was run over by an omnibus, the wheel of which passed obliquely across the abdomen. On admission immediately after the accident, the child was very pale and in intense abdominal pain. The abdomen was retracted, and later there was dulness in the right flank. Death occurred in 4 hours. At the *post mortem* examination there was a considerable quantity of fluid blood in the peritoneal cavity; the right kidney was extensively lacerated; there was a rupture of the right lung and blood in the pleura. The 5th rib of the left side was fractured (Mr. Heath's *Case-books,* 1892, vol. ii, p. 475). The right kidney and right lung are also preserved in the Museum.

1562. A liver greatly increased in size by the presence of numerous hydatid cysts. Transversely the liver measures about 33 cm., and the right lobe measures 22 cm. from above downwards. At the anterior edge of the upper surface, immediately to the left of the falciform ligament, a triangular piece of the abdominal wall with the skin is attached by firm fibrous adhesions between the visceral and parietal peritoneum. In the skin is a depressed opening which communicates with a small cyst beneath. The cyst-wall is attached to the skin by stitches. To the right of the attached piece of skin the anterior edge of the liver retains its normal form for 8 cm. Beyond this it is rounded by the presence of a large cyst, measuring 18 cm. in diameter. A large oval piece has been taken from the anterior wall of the cyst and the parasite completely removed, leaving merely the cyst formed by the tissues of the liver. Where the cyst-wall is in contact with the healthy liver-tissue it can be seen to be inseparably blended with it. In the upper surface of the left lobe an incision has been made which opens another cyst in which the shrunken parasitic cyst is shown.

The under surface of the liver is extremely deformed by the presence of numerous hydatid cysts. The under surface of the large cyst already described occupies the greater part of the right lobe. Above it is another cyst measuring about 10 cm. in diameter. The Spigelian lobe is occupied by a small cyst measuring about 5 cm. in diameter. To the left of this is a round cyst measuring about 5 cm. in diameter, over which the portal vein and hepatic artery are stretched. The common bile-duct and the cystic duct are stretched and flattened over the anterior wall of this cyst. The gall-bladder is contracted. To the left of this, again, is a cyst measuring about 8 cm. in diameter, which is that exposed by the incision in the upper surface of the left lobe. Attached to this is a third small cyst, apparently in the small omentum. The large partly collapsed cyst at the anterior edge of the left lobe, measuring now about 10 cm. in diameter, is that opened by the incision already described. A piece of glass has been passed through the opening. The cavity contains a few daughter-cysts, and its contents are darkly stained with bile.

1563. Four hydatid cysts from the omentum of the same case. Each consists of a large rounded sac, from which secondary pouches project in different places. The largest measures about 8 cm. in diameter.

1564. The right half of the pelvis from the same case, with two hydatid cysts lying between the bladder and the rectum. The upper part of the rectum lies completely to the right side. It has been divided in the middle line opposite the junction between the first and second pieces of the sacrum. Beyond this level the section has passed longitudinally along the gut. The bladder has been divided a little to the right of the middle line, the urethra having been left on the other part of the specimen. The reflection of the peritoneum from the bladder takes place opposite the tip of the coccyx. The cysts lie in the recto-vesical pouch. The upper cyst is oval in form and measures 7·5 cm. by 5 cm.; the lower cyst, which is in close contact with it, is more globular, and measures about 4 cm. in diameter. The larger cyst is attached by adhesions to the peritoneum, covering the middle part of the rectum, and the lower to the bottom of the recto-vesical pouch. To the upper part of the cyst a piece of omentum is adherent in which is a third cyst, unopened. The cyst-wall is formed of a dense fibroid layer developed from the subperitoneal tissue and peritoneum of the left side of the pelvis, from which the cyst arose. Internally it is lined by an extremely delicate semitransparent layer belonging to the parasite.

1565. The left side of the same pelvis, showing the remainder of the two cysts before described. The cysts have evidently developed in the subperitoneal tissue to the left of the rectum. In this region they have a wide attachment, from which they project into the recto-vesical space, covered by a layer of peritoneum. The peritoneum can be separated from the surface near the lower part of the cyst, but soon becomes inseparably blended with the wall.

✓ **1566.** Part of the right lobe of a liver, together with one large and several small hydatid cysts occupying the left lobe. The main cyst is oval in outline and measures 17 cm. in its longest diameter. The parasitic cyst has been completely removed and the inner surface of the adventitious cyst, which is composed of indurated liver-substance, is rough and in parts deeply bile-stained. On the anterior surface of the lower part of the cyst is a large irregular opening through which the cavity was drained. Close to the opening is an adherent piece of great omentum. At the middle of its length the cystic duct which lies in the lower part of the hydatid cyst is narrowed so as to admit only a fine probe, and beyond this point the duct is surrounded by dense inflammatory tissue. 8224

From a Welsh farmer, aged 42, in whom there had been enlargement of the upper part of the abdomen with occasional attacks of slight jaundice for 8 years. On two occasions the cyst had been tapped. At the time of the patient's admission into U. C. H. the abdomen was greatly distended as low as the umbilicus by a cystic enlargement of the liver. On April 22, 1899, the abdomen was opened by a vertical incision below the right costal margin and a large cyst found projecting below the edge of the liver. The cyst was incised and about 5 pints of fluid containing hydatids evacuated. The edges of the cyst were stitched to the abdominal wall and two drainage-tubes inserted. Repeated vomiting occurred after the operation and the patient died on April 26. (Mr. Pollard's *Case-book*, 1899, p. 96.)

/ ✓ **1567.** A sagittal section of the right lobe of a liver, in which there is a large abscess-cavity, which was opened by operation. The abscess-cavity occupies the upper part of the liver, rising above in the form of a rounded dome. The cavity is nearly circular in outline and measures 10 cm. in diameter. Its inner surface is irregular and the cavity is surrounded by a well-marked zone of induration, the part of the wall which rises above the natural surface of the liver being only 5 mm. in thickness. On the outer and posterior aspect of the liver is the opening through which the abscess was drained. In the surrounding liver-substance are seen the sections of thickened veins which are occupied by softened yellow thrombi. 7801

From a man, aged 42, who had had cholera and dysentery in India 15 years previously. On admission into U. C. H. the patient was suffering from dysenteric diarrhœa, with irregular fever and enlargement of the liver. A large abscess in the liver was opened through the diaphragm and pleura, and drained. Death occurred on the 11th day. There were multiple small abscesses in the liver; there was extensive ulceration of the large intestine. The mucous membrane of the vermiform appendix was ulcerated, one ulcer having perforated. There was purulent peritonitis in the pelvis. (Surg. Reg. Rep. 1897, p. 26, No. 627.)

1568. A sagittal section of the right lobe of a liver, the substance of which is occupied by a large and very irregular abscess-cavity. Part of the diaphragm is adherent to the surface of the liver and through it the abscess was opened by operation. At one spot the abscess-cavity reaches the upper surface of the liver, and at a corresponding point on the under surface causes a distinct bulging; below and behind the cavity for a distance of 6 cm. the liver-substance is softened and breaking down as the result of the extension of the suppuration into it. 8784

From a man, aged 26, who was admitted into U. C. H., under the care of Dr. Bradford, on Dec. 27, 1900. The dysentery from which he was then suffering began in Calcutta in the preceding August. On admission there was irregular fever with tenderness over the liver and some upward extension of the liver-dulness. On Dec. 29, Mr. Raymond Johnson explored the liver with an aspirator through the 9th interspace; a few drops of pus were withdrawn; part of the 10th rib was removed, the diaphragm sutured to the parietal pleura and the wound plugged with gauze. On Jan. 4, 1901, the abscess in the liver was opened through the diaphragm and a drainage-tube inserted. The discharge was profuse, and diarrhœa with much mucus in the stools continued; the fever persisted and the patient steadily lost strength. On Jan. 17, 30 ounces of blood-stained fluid were withdrawn with the aspirator from the right pleural cavity. Death occurred on Jan. 29. There was extensive dysenteric ulceration of the large intestine.

1569. Numerous minute biliary calculi composed of cholesterine, which were found in the pus of an abscess of the liver. They are mostly quadrilateral plates, rather less than 2 mm. in diameter. 8858

From a tropical abscess of the liver in a man aged 31. (Godlee, "On the Surgical Aspect of Hepatic Abscess," B. M. J., Jan. 1900, Case xv.)

1570. A gall-bladder filled with gall-stones, which was removed by operation. The gall-bladder is pyriform in shape and 7 cm. in length. During the operation for its removal the muscular coat has been extensively stripped from the mucous membrane, which is tightly stretched over the small facetted gall-stones with which the gall-bladder is packed. A single stone, larger than the rest, occupies the neck of the gall-bladder and above this is seen the divided lumen of the cystic duct. The mucous membrane of the gall-bladder is smooth, opaque, and thickened. 8282

From a woman, aged 62. The operation was performed by Mr. Godlee in June 1899. Three years before the operation the patient had an attack of jaundice with pain below the shoulder-blades; this was followed by symptoms of chronic dyspepsia and in Oct. 1898 by irregular vomiting. The patient did well after the operation, and very slowly recovered completely from the dyspeptic symptoms.

1571. A cylindrical gall-stone with bluntly rounded extremities, measuring 4·5 cm. in length and 2·5 cm. in width. The surface is in some parts coarsely granular and crystalline and in others distinctly nodular. The gall-stone is pale in colour and slightly bile-stained. 7947

The calculus was removed from the cystic duct of a woman aged 62.

1572. An irregularly shrunken and thickened gall-bladder removed by operation. The lumen is occupied by a fragment of a gall-stone, the fractured surface of which is deeply bile-stained. On the upper surface of the specimen is seen the divided cystic duct, the lumen of which is obliterated. 7823

From a woman, aged 41, who was admitted into U. C. H., under the care of Mr. Barker, May 14, 1897. On Oct. 3, 1894, cholecystotomy had been performed at the Women's Hospital and a large number of calculi removed. A fistula remained; there was no history of jaundice. On admission the fistula discharged a small quantity of mucoid fluid. On May 27, 1897, the gall-bladder was excised, together with the fistula. Patient was discharged on August 3, the wound having nearly healed. (Mr. Barker's *Case-books*, 1897, vol. i, p. 279.)

1573. A gall-stone, 16 mm. in length, removed by operation from the common bile-duct. The surface is irregularly broken, but presents on two aspects the remains of facets. The smaller calculi were removed by irrigation from the hepatic ducts. 8861

From a man, aged 62, who had been ill for 18 months with wasting, extreme jaundice, and rigors. The operation was performed by Mr. Godlee. The patient was temporarily completely restored to health, but died about 18 months after the operation with symptoms of suppuration in the bile-ducts.

1574. An oval gall-stone, 2·3 cm. in length, removed by operation from the common bile-duct. 8859

From a man, aged 37, who was admitted into U. C. H., under the care of Mr. Godlee, on Oct. 7, 1901. Two years previously an attack of jaundice lasting many weeks occurred. In May, 1900, the abdomen had been opened and a hard mass felt which was thought to be a malignant growth in the head of the pancreas. The jaundice persisted with varying intensity and in Oct. 1901 was well marked; there were frequent attacks of fever, but no rigors; the liver was enlarged. On Oct. 15, 1901, the abdomen was again opened and a stone felt in the common bile-duct. The stone was removed through an incision in the duct, and drainage-tubes were inserted into the latter and into the gall-bladder. Death occurred from peritonitis on the 12th day, after numerous attacks of hæmorrhage from the wound.

1575. Four gall-stones removed by operation from the gall-bladder and cystic duct from a case in which there was also malignant disease of the liver. The three calculi which occupied the much-distended gall-bladder are smooth and facetted. The lowest stone, which was very firmly impacted in the cystic duct, is rough, reddish-brown in colour, and facetted only at its upper extremity. 8860

From a woman, aged 30, in whom there was intense jaundice. Cholecystotomy was performed by Mr. Godlee. Troublesome hæmorrhage subsequently occurred from the wound. Death occurred some months after the operation. The growth in the liver was a columnar-cell carcinoma of the bile-ducts.

1576. An ellipsoidal gall-stone, 3·5 cm. in length. It has a lowly lobulated smooth surface and a yellowish-brown colour. 8857

From a middle-aged woman, who was under the care of Mr. Godlee in the Brompton Hospital. Malignant disease, probably involving the hepatic flexure of the colon, was diagnosed. An exploratory abdominal section was performed and appeared to confirm this diagnosis. Long afterwards the gall-stone preserved in the specimen was passed *per rectum*, and the patient was completely restored to health.

INJURIES OF AND OPERATIONS UPON THE SPLEEN.

Rupture or wound of the spleen is attended with profuse hæmorrhage, which often proves fatal (1577). A ruptured spleen has been successfully removed by operation, and the organ has also been successfully excised for hypertrophy and other diseased conditions.

✓ **1577.** A spleen presenting numerous superficial ruptures almost confined to the inner surface. 5500

From a man, aged 27, who was struck on the left hip by a buffer. There was crepitus about the left hip with shortening of the limb and considerable extravasation of blood over the trochanter, and pain over the left lower ribs. Death occurred on the 2nd day. There was a comminuted fracture of the upper end of the left femur with fracture of the acetabulum. All the ribs on the left side below the 6th were broken; there were superficial wounds on the surface of the left lung with hæmothorax. In connection with the rupture of the spleen there was hæmorrhage into the gastro-splenic omentum. The left kidney was superficially ruptured. (Mr. Heath's *Case-books*, 1880, vol. ii, p. 478.)

INJURIES AND DISEASES OF THE INTESTINES.

Injuries.

Contusion of the intestines is occasionally followed by sloughing of the damaged portion.

Rupture of the intestines, without external wound, much more commonly involves the small than the large bowel. The rupture probably results in most cases from the violent compression of the bowel against the spine. Owing to its relation to the spine and its want of free mobility, the third part of the duodenum is particularly liable to rupture in severe abdominal contusions (1579). In rupture of the third part of the duodenum the rent in the gut may be behind the peritoneum, but in all other situations the peritoneal coat is torn.

Wound of the intestines, more common in the small than the large, is most commonly due to a stab or a gun-shot wound ; in the latter case the perforations are often multiple. It is characteristic of ruptures and perforations of the intestines that, owing to the retraction of the muscular coat, the edge of the opening is formed by the everted mucous membrane (1580), thus contrasting with most perforations following ulceration (1582).

1578. The pyloric end of a stomach with part of the duodenum, the latter ruptured by external violence in its second part. The rupture extends almost completely around the intestine, the continuity of which is preserved only by two narrow strips, the larger about 12 mm. in breadth. The mucous membrane is much everted and completely overlaps the torn edge of the rest of the wall of the bowel. The everted mucous membrane is thickened and is united by inflammatory exudation to the surface which it overlaps. 690

The injury was caused by the wheel of a carriage passing over the upper part of the abdomen.

1579. The lower part of a duodenum, with the commencement of the jejunum. In the duodenum is a rounded lacerated aperture about 2 cm. in diameter. The opening in the peritoneum and muscular coat slightly exceeds in size that in the mucous membrane. 5060

The patient, a man aged 30, fell upon his abdomen in the street; so far as he knew, he fell on no projecting object. He at once felt acute pain in the abdomen. When admitted he was suffering from acute peritonitis, and died 30 hours after the accident. On opening the abdomen a considerable quantity of undigested food was found in the peritoneal cavity.

1580. Two pieces of small intestine, the lower of which has been laid open longitudinally, each piece having been perforated by a bullet. In the upper, unopened portion the two apertures are situated at the same level on opposite aspects ; the openings are unequal in size, rounded in outline, and in each the mucous membrane is everted around the edge of the opening. In the lower piece of intestine the two wounds lie close together in the line of the axis of the bowel ; the upper opening is rounded and the lower oval ; in both the mucous membrane is prominently everted. On the opposite aspect of the bowel the mucous membrane presents a vertical rent, around which the mucous membrane is swollen and discoloured. 5504

From a man, aged 30, who died from commencing general peritonitis 18 hours after the infliction of a suicidal bullet-wound of the abdomen. The bullet entered the abdomen through the 10th costal cartilage of the left side and was found, together with a small piece of cloth, embedded in the lower end of the left erector spinæ muscle. (Mr. Marshall's *Case-books*, 1880, vol. ii, p. 399.)

1581. A coil of small intestine, in which the continuity of the bowel was restored by end to end suture, after excision of the part wounded by a bullet. The seat of the operation is indicated only by a row of silk sutures in the intestine and mesentery. There are numerous patches of inflammatory exudation on the adjacent parts of the intestine. 6325

From a man, aged 37, who was admitted into U. C. H. in November 1887, suffering from a bullet-wound of the abdomen. Abdominal section was performed by Mr. Barker, and a coil of small intestine, in which were two bullet wounds, was excised. The ends were brought together by a continuous silk suture, not including the mucous membrane, and a second row of Lembert's sutures. On the 5th day stercoraceous vomiting set in, the abdominal incision was reopened, but no cause for the symptoms was detected. Death occurred on the 6th day. At the *post mortem* examination the sutured intestine was found to be freely pervious and the apposition was perfect; there was early general peritonitis. The tissues around the track of the bullet were sloughy. (Surg. Reg. Rep., 1887, p. 135, No. 2545.)

Ulceration of the Duodenum following severe Burn of the Skin.

In very rare instances ulceration of the duodenum has been met with in cases of severe burn of the skin. It has been known to prove fatal by hæmorrhage or by perforation into the peritoneal cavity.

1582. The duodenum, probably of a child, in the first part of which is a perforating ulcer. The ulcer, which lies with its long axis parallel with the axis of the bowel, is 2 cm. in length, and in the natural position of the parts its floor was formed by the pancreas, which has been turned downwards at the back of the specimen and remains adherent only to the lowest border of the opening. The edges of the ulcer are rounded, except the lower border, which is shelving. The surrounding mucous membrane is superficially eroded. 5029

The ulceration followed a severe burn.

ABDOMINAL HERNIA.

Hernia of the abdomen is a protrusion of some of the contents of the abdominal cavity through one of the natural openings for the passage of vessels and nerves, or through any part of the abdominal wall which is by nature weak or has been weakened by injury or disease. Hernial tumours of the abdomen are composed of a sac, the coverings of the sac, and the contents.

The specimens have been arranged in the following order :—

I. Specimens illustrating Hernia in general.
  - *a.* The Sac.
  - *b.* The Coverings.
  - *c.* The Contents.
  - *d.* Irreducible Hernia.

II. Special Herniæ.

III. Strangulated Hernia.

The Hernial Sac.

In certain forms of hernia the peritoneal sac is *congenital* and results from arrested development, as in the case of an unobliterated processus vaginalis testis; in all other forms the sac is *acquired* and is formed by a portion of the parietal peritoneum thrust through the opening in the abdominal wall by the protruded viscera. It is described as having a neck and body. The *neck* is the narrow part which lies in the aperture in the abdominal wall, and the *body* is the expanded part beyond. The opening of the neck into the abdomen is called the *mouth of the sac*, and the opposite extremity of the body the *fundus*.

In recent herniæ of small size the peritoneum forming the sac differs in no way from that within the abdomen (1584). As the protrusion increases, the peritoneum in the ring becomes puckered. After a time the folds thus formed become adherent and the neck of the sac becomes thickened and opaque (1585). The opacity and thickening are still further increased by the constant pressure to which the sac is exposed either between the contents and the abdominal walls, or beneath the pad of a truss (1586). With this thickening there is a tendency to contraction, which, unless counteracted by the stretching caused by the protrusion of the viscera, may occasionally lead to complete occlusion (1587). In old herniæ the sac is uniformly thicker and more opaque than normal peritoneum. The sac is always more or less adherent to the surrounding parts, and cannot, except in very exceptional circumstances, be reduced into the abdomen. In certain herniæ of the bladder, cæcum, and sigmoid colon the sac is in part deficient.

1583. The sac of a small femoral hernia. The sac is of a truncated conical form, its neck being its largest part. The peritoneum forming it is not different in appearance from that lining the abdominal wall in its neighbourhood. The exterior of the sac is thickly covered with lobules of fat. 2305

1584. The sac of an umbilical hernia, with the adjacent part of the abdominal wall. The neck of the sac is of an oval form, and immediately beyond the neck the sac is expanded in a globe-like form, and widely overlaps the adjoining part of the abdominal wall. The peritoneum forming the sac is loosely wrinkled, and has the appearance of peritoneum as it naturally lines the abdominal wall. The peritoneum which forms the neck of the sac, and that for a short distance around, is slightly thickened and more opaque than natural, and appears firmly adherent to the parts on which it lies. The skin over the sac is for the most part very thin and on the summit is scarcely recognisable. 723

1585. The sac of a large inguinal hernia, which has descended into the scrotum and rests below on the tunica vaginalis, which appears to have been slightly distended into a hydrocele. A falciform fold crosses the back of the sac, so as externally to render it bilobed; the fold consists of peritoneum, in which a firm cord-like process of connective tissue has been developed; the part of the sac above the constriction is considerably larger than the portion below. 2303

1586. The sac of a small inguinal hernia, with a piece of the peritoneum of the abdominal wall. The sac is shallow, its interior uneven and wrinkled, and the peritoneum forming it greatly thickened and devoid of transparency; the tissues lying around the sac appear to have been closely united with it. The peritoneum in the neighbourhood of the protrusion presents changes similar to those in the sac itself, being thickened, opaque, and deeply wrinkled. 705

1587. A portion of parietal peritoneum, connected with which is the obliterated sac of a small femoral hernia. The remains of the sac (seen on the back of the specimen) form a solid club-shaped pendulous mass 3·5 cm. in length; the neck of the sac is not completely obliterated, a semilunar fold of peritoneum remaining to indicate its position. The peritoneum in the neighbourhood of the protrusion is considerably thickened and creased in a radiate manner around the neck of the sac. A slender cord-like process of fibrous tissue is attached to the peritoneum near the neck of the hernial sac, apparently the remains of an adhesion passing either to the omentum or to some portion of intestine. 123

1588. The sac of a small right inguinal hernia removed by operation, laid open. In two positions, one immediately below the neck and the other midway between this and the fundus, the sac is constricted by a fibrous thickening of the wall, which projects prominently on the inner surface. In connection with the lower constriction a lobulated mass of small shrunken cysts projects into the sac, having only two slender attachments to the cyst-wall. In the recent state the cysts were thin-walled and contained mucoid fluid. In connection with the upper constriction there is a similar but less marked cystic formation. The whole sac is thicker than natural, and its inner surface reticular. 8144

Microscopic Structure.—The wall of the hernial sac consists of loose connective tissue undergoing extensive hyaline change, and with abundant small vessels surrounded by a round-cell infiltration. The cystic change appears to have resulted from mucous softening.

From a man, aged 60, in whom, in addition to a right inguinal hernia, a gradual enlargement of the right testicle had been noticed for two months, with abdominal discomfort. Four or five years previously an attack of hæmoptysis had occurred. There was harsh breathing at the apex of the right lung; there was a hard mass at the upper part of the right testicle; the vas was not enlarged; the vesiculæ and left testicle appeared normal. The right testicle was removed and radical cure of the hernia performed by Mr. Godlee. The testicle, which contained a large calcareous mass in the epididymis, is preserved among Diseases of the Testicle.

1589. A thin-walled cyst, which is connected with the lower extremity of the sac of an inguinal hernia. 8559

From a single woman, aged 31. A small swelling had been noticed in the right groin for two months. The cyst is probably a hydrocele of the canal of Nuck.

1590. The sac of a femoral hernia removed by operation. It is thin and reticulated on its inner surface, and some strands of fibrous omentum are adherent in the region of the neck. In one situation a group of three very thin-walled cysts, the largest 15 mm. in length, projects from the inner surface of the hernial sac. Attached to the wall of the largest cyst is a fibrous nodule the size of a small pea, softened in the centre. 7785

From a woman, aged 38. Operation was performed for strangulation of the hernia.

1591. A small part of the peritoneum lining the abdominal wall of the inguinal region, together with the obliterated sac of a small hernia. In the lower part of the peritoneum there is a puckered depression, attached to the outer aspect of which is a dense fibrous cord surrounded by fat; in connection with this cord is a flask-shaped calcareous body measuring 1·5 cm. in length.

Removed *post mortem* from the body of an old man.

1592. A portion of peritoneum lining the abdominal wall, and the sac of a small femoral hernia connected with it. The size of the sac is exaggerated in appearance by an accumulation of loose adipose tissue around it. The neck of the sac is almost occluded by thickening and subsequent contraction of the peritoneum forming it; a bristle has been passed through the neck into the sac beyond, the wall of which is not apparently changed in texture, but the abdominal peritoneum, for a short distance around the neck of the sac, is increased in thickness. 2661

THE COVERINGS OF THE SAC.

These vary with each form of hernia; but in all, the coverings in immediate contact with the sac are the subperitoneal tissue and the internal abdominal fascia (fascia transversalis, iliaca, &c.). The amount of fat in the subperitoneal tissue varies in different subjects, and in all cases of old hernia this layer becomes blended inseparably with the fascia, forming a single covering known as the "fascia propria" of the α fat hernia. In old herniæ the fat may entirely disappear, and the fascia propria then β fat forms a tough membrane. In other cases the subperitoneal fat covering a small hernial sac may increase in amount so as to simulate a fatty tumour. In all herniæ of any standing it is difficult to separate the deeper coverings one from another.

1593. A dissection of the parts concerned in an oblique inguinal hernia of the right side. Parts of the coverings of the hernia have been successively removed, so that there are exposed, from without inwards, the intercolumnar fascia continuous with the aponeurosis of the external oblique muscle, the cremasteric fascia, the transversalis fascia, the subperitoneal areolar tissue, the peritoneal sac, and the omentum within the sac.

THE CONTENTS OF THE SAC.

These are most commonly small intestine and omentum; in an ordinary reducible hernia the intestine differs in no way from its normal state (1594). Omentum which has been long in a hernial sac usually has its folds more or less matted together (1596). The large intestine less commonly enters a hernia; the transverse colon is most usually met with in umbilical herniæ; the sigmoid colon most commonly enters a left inguinal hernia; the cæcum is chiefly met with in congenital hernia of the right side. The vermiform appendix may form the sole contents of a hernial sac (1601).

In exceptional cases, especially of ventral or umbilical hernia, almost any of the abdominal viscera, except the pancreas, may be found wholly or partly in the sac. Of the pelvic viscera, the bladder, uterus, ovary, or Fallopian tube may be found in the sac; of these the ovary is by far the most common.

1594. The lower part of the abdominal wall of the right side, and an external inguinal hernia which occupies the scrotum. The inguinal canal has lost its obliquity, and passes almost directly forwards. Beyond its neck the sac expands so as to form a large ovoid swelling. The sac is occupied by intestine; its inner surface and the intestine are uniformly smooth, and present no unnatural appearance. The sac measures 13 cm. in length; the testicle is situated behind and to the outer side of its lowest part. The tunica vaginalis is slightly distended into a hydrocele.

1595. A small umbilical hernia, with the adjoining part of the abdominal wall. The protrusion appears to have come through the middle of the umbilicus. The sac has a distinct covering from the aponeurosis of the external oblique, and between this covering and the sac is some delicate areolar tissue, possibly representing the transversalis fascia. At the summit of the hernia all the coverings are blended indistinguishably with the sac, and the overlying skin is smooth. The contents of the hernia are formed wholly by omentum, the folds of which are readily separable, and the fat unaltered in appearance. The sac, where unopened, has a somewhat knotty or lobulated surface in correspondence with the folded omentum within it.
3745

1596. Part of a mass of omentum from an umbilical hernia. The protruded portion has become a single compact mass by long-continued inflammation of its textures.
624

The patient was an insane female, and wounded the hernia. The mass of omentum was removed by ligature by Mr. Liston.

IRREDUCIBLE HERNIA.

An *irreducible hernia* is one in which the contents cannot be returned into the abdomen, and yet are not held so tightly at the neck of the sac as to interfere with their circulation and the performance of their functions. In many herniæ the contents are partly reducible and partly irreducible.

The most important causes of irreducible hernia are:—

1. The presence of adhesions (*a*) between the sac and its contents, usually omentum (1597), or (*b*) between different parts of the contents. Thus very commonly the different folds of a portion of omentum may become so adherent as to convert it into a solid mass too large to return through the aperture by which it descended; less commonly adhesions may form between different loops of intestine (1599) or between intestine and omentum.
2. Gradual thickening and contraction of the neck of the sac.
3. An accumulation of mesenteric fat in connection with the bowel in the hernia, especially in herniæ of the large intestine. Nos. 1600, 1601 illustrate a similar condition in connection with the vermiform appendix.
4. The absence of a complete peritoneal sac. In certain herniæ of the bladder, cæcum, and sigmoid colon the protruded viscus is imperfectly covered by the peritoneal sac, and is therefore adherent to the surrounding structures and irreducible.

1597. The lower part of the anterior abdominal wall of the left side, with an irreducible external inguinal hernia. The hernia passes about 8 cm. below the external abdominal ring, which is dilated to about 2·5 cm. in diameter by the highest part of the sac. The sac of the hernia becomes slightly larger as traced from the external ring, and is somewhat club-shaped. The sac is completely filled with indurated omentum, which in places is adherent to it. 4594

1598. The parts concerned in an old irreducible inguinal hernia of the right side. The hernia has descended into the scrotum, and rests on the testicle. The sac is 10 cm. in length, and of a long oval form. The hernial sac is filled with small intestine, the surface of which is coated with a thin shreddy layer of fibrous tissue; the interior of the sac has a similar covering; and at the lower part of the hernia the intestine is connected with the sac by thick bands of adhesion. The peritoneum of the sac is slightly thickened and more opaque than natural. On the inner side, immediately above the neck of the sac, the intestine is dilated and firmly adherent to the peritoneum lining the abdominal wall. The coverings of the sac, excluding the skin and subcutaneous fat, have been dissected in four layers. 4856

1599. A large, irreducible, external inguinal hernia, with the part of the abdominal wall adjoining its neck. The protrusion is oval in form, and about 12 cm. in length; its fundus rests on the testicle. The neck of the sac is about 5 cm. in diameter. The contents are composed exclusively of intestine, between the coils of which delicate adhesions have been formed, as well as between the intestine and the inside of the sac. The intestine within the abdomen appears to have been closely adherent to the peritoneum lining the abdominal wall in the vicinity of the protrusion. 4846

1600. A vermiform appendix, nearly 7 cm. in length, which was removed by operation from the sac of a right inguinal hernia. In the mesentery there is a very extensive deposit of fat. On one aspect of the specimen the surface which was adherent to the hernial sac is recognisable. 6458 A

From a man, aged 50, who had been the subject of a right inguinal hernia since childhood. The hernia was partly irreducible. (Surg. Reg. Rep. 1889, p. 270, No. 714.)

1601. A vermiform appendix removed by operation from the sac of a right inguinal hernia. In the concavity of the curved appendix there is an excessive deposit of fat in the mesentery. The mucous membrane is thickened, and in it is embedded a small fragment of egg-shell. 6961

The appendix was removed by operation from the sac of a right inguinal hernia in a man, aged 52. The hernia was of 14 months' duration, and for a short time had been irreducible.

SPECIAL HERNIÆ.

External Inguinal Hernia.

An external or oblique inguinal hernia escapes from the abdomen through the internal abdominal ring on the outer side of the epigastric artery (1604), and follows the course of the spermatic cord or round ligament through the inguinal canal. In this course the sac receives the following coverings:—1. Subperitoneal tissue; 2. Transversalis fascia, as it passes through the internal abdominal ring; 3. Cremasteric fascia, formed of the cremaster muscle and the fascia between the bundles of fibres of which it is composed (the hernia comes in contact with this as it escapes from beneath the lower border of the internal oblique); 4. The intercolumnar fascia, obtained as the sac passes through the external abdominal ring; 5. The superficial fascia and fat (1593).

The hernia passes downwards almost invariably in front of the spermatic cord, and, however large the sac may be, the testicle is always situated below and very slightly behind its fundus (1612). The hernia, before its escape from the external abdominal ring, is sometimes spoken of as a "bubonocele." When it has passed into the scrotum or labium it is called a scrotal or labial hernia. In old herniæ the internal and external abdominal rings are drawn together (1609); the sac is usually much thickened at its neck, and it is here that strangulation most frequently occurs. The contents usually consist of omentum and small intestine, but the cæcum and vermiform appendix or the sigmoid colon may be drawn in. Inguinal herniæ often reach an enormous size. They are frequently irreducible, from the formation of adhesions, particularly in connection with omentum (1612). They are most common in males. The coexistence of an inguinal hernia and a hydrocele on the same side is not uncommon (1616).

In addition to the ordinary acquired form of inguinal hernia above described, certain other varieties are met with in the male, which are dependent on abnormal conditions of the processus vaginalis testis. They are as follows:—

1. *Funicular Hernia.*—The processus vaginalis is closed normally below from the tunica vaginalis, but the upper part remains as a pouch in communication with the peritoneal cavity. Into this funicular process the hernia descends. This is probably the common form of hernia in infancy. Its relation to the testicle and spermatic cord are practically the same as in acquired hernia.
2. *Hernia into the Tunica Vaginalis.*—The processus vaginalis remains patent throughout and thus the hernia descends into the tunica vaginalis (1618). This form of hernia is often called "congenital," but the name is inappropriate, for the hernia may first appear at any age. If the hernia is large and tense the testicle is concealed in the swelling. The neck of the sac is frequently narrowed by a sharp constricting ring, due apparently to an incomplete obliteration of the processus vaginalis.
3. *Infantile Hernia.*—In the form of hernia to which the name "infantile" is inappropriately applied, the processus vaginalis testis remains unobliterated except at the level of the internal abdominal ring and the hernial sac descends behind it and often bulges forwards into it. In operating on such a hernia the tunica vaginalis is necessarily opened before the hernial sac is reached, but the hernia presents no distinctive clinical features.

1602. A testicle with the spermatic cord and part of the abdominal wall of the inguinal region. In the situation of the inguinal canal the peritoneum of the abdominal wall is protruded into a hernial sac which lies in front of the spermatic cord, but does not project beyond the external abdominal ring (bubonocele). 727

1603. The sac of an inguinal hernia, with the part of the abdominal wall around its neck, and the testicle. The sac, which is of a regular oval shape, measures 7·5 cm. in length, and has extended into the scrotum almost as far as the testicle; its neck is about 12 mm. in diameter, and the peritoneum around and forming it is thickened and opaque. Below its neck the sac enlarges somewhat abruptly, and its upper and lower ends are almost symmetrical in form; the peritoneum forming it is of natural appearance and thrown into long wrinkles.

1604. The sac of a right external inguinal hernia, dried, with some of the vessels injected and the vas deferens filled with mercury. The sac measures 13 cm. from its neck to its lowest part. The situation of the internal abdominal ring is marked by the injected epigastric artery, a part of which remains and half encircles the neck of the sac. The upper part of the sac which lay within the inguinal canal is almost cylindrical, but below this it abruptly enlarges and is oval in shape. The cremasteric artery, which appears larger than natural, spreads out into numerous branches, many of them not filled with the injection, which ramify on the sac, supplying it and its coverings. The spermatic artery has not been injected. The vas deferens lies along the posterior wall of the sac. 706

1605. A scrotal inguinal hernia from a child, dried after the injection of its vessels with mercury. The sac is pyriform, its neck, where divided, being less than 1 cm. in diameter. The vessels of the testicle and its coverings are spread out on the back of the sac. 707

1606. The parts concerned in a right external inguinal hernia dried after injection of the vessels. The sac of the hernia is of a long pear-like form and its neck is almost circular. Beneath the peritoneum the deep epigastric artery is seen passing around the inner side of the neck of the sac; and branches of the cremasteric artery have been injected on the back of the sac. 4496

1607. Part of the anterior abdominal wall of the left side and an external inguinal hernia, dried after injection of the blood-vessels. The hernia has descended into the scrotum. The deep epigastric artery winds around the inner side of the neck of the sac, ascending afterwards slightly outwards over the rectus. The inguinal canal is direct, and the epigastric artery appears to have been displaced in correspondence with the altered position of the internal abdominal ring, and winds unnaturally inwards towards the middle line. 4526

1608. The parts concerned in a right external inguinal hernia, dried after injection of the blood-vessels. The sac is elongated and rests below upon the tunica vaginalis. The epigastric artery winds around the inner aspect of the neck of the sac and branches of the spermatic artery ramify on its posterior surface. 4495

1609. The sac and contents of a large right external inguino-scrotal hernia, with the part of the abdominal wall adjoining its neck, the parts being dried after injection of the vessels. The protrusion is of an oval form, tapering towards its upper end, and measures 23 cm. in length. The inguinal canal passes directly forwards, and is reduced to one large oval opening, nearly 8 cm. in its longest diameter. The spermatic artery and veins pass directly along the middle of the posterior wall of the sac, and the epigastric artery passes beneath and around the inner side of its neck, in correspondence with which it has been lengthened and describes an extensive semicircular curve. The deep circumflex iliac artery arises from the external iliac near the outer side of the neck of the sac. The contents of the sac appear to be formed entirely by intestine.

1610. The parts concerned in a left external inguinal hernia. The inguinal canal is stretched by the upper part of the protrusion, and has been rendered nearly direct. The sac of the hernia is 10 cm. in length, and gradually enlarges from its upper towards its lower end; it is filled entirely by omentum. The testicle lies below the fundus of the sac. 3790

✓ **1611.** Part of the sac of an inguinal hernia, together with part of the omentum filling it, and the atrophied testicle. The omentum in the sac has entirely lost its natural appearance and is converted into a number of dense, elongated, fatty masses connected together and at several places with the hernial sac by glistening fibrous bands and cords. 5584

The parts were removed by operation.

1612. The lower part of an abdominal wall of the left side, and a large scrotal hernia. The protrusion measures 18 cm. in length, and is of a long pyriform shape, its lower end being slightly the larger. The inguinal canal is directed straight forwards, and considerably stretched by the highest part of the hernia. The contents of the sac are exclusively omentum. The testicle is situated immediately below the fundus of the sac, by the advance of which it has been moved downwards. A bristle has been placed in the part of the vas deferens which lay within the pelvis. 703

1613. The parts concerned in an external inguinal hernia of the right side. The sac is oval, slightly constricted superiorly, and protrudes 4·5 cm. from the external abdominal ring. The wall of the sac is thicker and less transparent than healthy peritoneum. The portion of the sac within the inguinal canal is filled with indurated and adherent omentum. The spermatic cord is unusually long. 709

1614. The parts concerned in an external inguinal hernia of the left side, together with part of the sigmoid colon. The abdominal wall has been dissected from the peritoneum lining it, so as to expose the portion of the sac within the inguinal canal. The sac is cylindrical in form and reaches as low as the testicle. The loop of the sigmoid colon, which has been reduced from the sac, is much thickened and its two limbs closely approximated. By the displacement of the parts occasioned by the formation of the hernia the attachment of the sigmoid mesocolon to the parietes has been shifted downwards to a position corresponding to the lower border of the neck of the sac. 4999

A further displacement of the attachment of the sigmoid mesocolon into the sac itself would have rendered the hernia irreducible.

1615. The sac of a right inguinal hernia, which has descended into the scrotum and reaches the testicle. On its posterior and lower parts the coverings remain. The sac is 10 cm. long and slightly pyriform, its fundus being expanded. The lower part of the ileum is firmly adherent to the parietal peritoneum immediately above the posterior part of the neck of the sac. 725

1616. The sac of a long hydrocele, reaching upwards almost to the external abdominal ring. Above the hydrocele is a small omental hernia. The distended tunica vaginalis forms an almost globular sac, narrowed slightly towards its upper end. The sac of the hernia has, for the most part, been removed, and the rounded mass of omentum which filled it turned upwards. The lowest part of the hernia probably lay on the front of the distended tunica vaginalis. 2367

1617. A wax model of a right inguinal region and adjoining parts, the inguinal canal and scrotum being occupied by a hernia into the tunica vaginalis ("congenital hernia"). Across the neck of the sac passes a large branch of the external pudic artery. As the testicle is surrounded by the contents of the sac there is no external indication of it. 726

1618. The parts concerned in a hernia into the tunica vaginalis of the right side. The sac of the hernia, which is very thin and formed by the unobliterated processus vaginalis, has a somewhat globular form like that of a hydrocele. At the external abdominal ring the sac becomes suddenly constricted. The testicle lies free within the sac, the spermatic cord passing upwards behind its posterior wall. The testicle lies almost horizontally, with its upper end directed inwards. 714

1619. A hernia into the tunica vaginalis of the right side, the sac of which measures 9 cm. in length. The sac is occupied by a mass of omentum, which in its lower part presents a normal appearance and at one spot is firmly adherent to the body of the testicle. In the upper part of the sac and at the neck the omentum is condensed and universally adherent. In this portion of the omentum a rounded fibrous sac has formed, 3 cm. in diameter, and communicating above by a constricted neck with the peritoneal cavity. 715

It is probable that the sac-like cavity which has formed in the adherent omentum was occupied by a knuckle of intestine.

1620. The sac of a hernia into the tunica vaginalis, laid open from the front. The neck of the sac is 2 cm. wide. Immediately below the neck there is an oval opening in the posterior wall of the sac about 2 cm. in its longest diameter, through which the testicle can be seen; at the margin of the opening there are some shreddy adhesions by which the omentum has probably been connected with the sac. The testicle is visible from behind at the upper part of the specimen and the vas deferens forms a convoluted loop on the back of the sac, descending for a distance of 4·5 cm. below the level of the testicle. 728

The specimen illustrates a hernia into the tunica vaginalis associated with an incomplete descent of the testicle, the vas and tunica vaginalis having descended considerably lower than the testicle itself. (Lockwood, 'Hunterian Lectures on the Development and Transition of the Testis,' 1888, p. 98.)

1621. The parts concerned in an inguinal hernia of the right side, together with the testicle and spermatic cord. The sac of the hernia has been laid open in front and the tunica vaginalis in front and behind; the former has a length of 10 cm., the latter of 13 cm.; the fundus of the hernial sac descends in front and to the outer side of the tunica vaginalis and at its posterior and inner part communicates with the latter by a rounded opening 1·5 cm. in diameter and bounded below by a sharp crescentic border. Projecting into the upper part of the hernial sac and continuous with it around the whole circumference of its mouth is a second peritoneal sac which is thin and measures 5 cm. in length. Both aspects of this second sac present the appearances of normal peritoneum, except that on the outer surface near the lower extremity there are two horizontal thickenings passing nearly halfway around it. The lower extremity of this sac is open, and has a diameter of nearly 2 cm.; and beyond this the border forms a narrow expanded rim. This sac contains a loop of small intestine, the lower part of which projects from the open extremity of the sac into the main hernial sac above described.

It is probable that the secondary sac, open at its lower extremity, has resulted from invagination of the whole circumference of the neck of the primary hernial sac. (Raymond Johnson, Trans. Path. Soc., 1902.)

1622. A drawing of an external inguinal hernia of the right side, the superficial tissues having been dissected from the external oblique muscle and the upper part of the hernial tumour.

1623. A drawing of the same specimen. The external oblique muscle has been divided and reflected together with the intercolumnar fascia over the upper part of the hernia, thus exposing the internal oblique and the cremasteric fascia, prolonged from its arched lower border on to the hernia.

1624. A third drawing of the same specimen. The internal oblique and cremasteric fascia have also been divided and reflected, so as to expose the lower border of the transversalis muscle. Below the latter the position of the internal abdominal ring is indicated by a groove in the transversalis fascia.

INTERNAL INGUINAL HERNIA.

In the form of inguinal hernia distinguished as *internal* or *direct*, the protrusion takes place to the inner side of the epigastric artery (1626, 1629), within the area of the triangle of Hesselbach. The sac is formed from a portion of the peritoneum of the mesial inguinal fossa, and the course and coverings of the hernia vary somewhat according to the spot at which the protrusion occurs. When protruding from the outer part of the fossa, close to the epigastric artery, the hernia enters the inguinal canal to the outer side of the edge of the conjoined tendon of the internal oblique and transversalis muscles, and has the same coverings as an external hernia (1627). When escaping more internally, it either receives a covering from the conjoined tendon, which replaces the cremasteric fascia (1626), or it bursts through the tendon without receiving any covering. In other respects it resembles an external hernia; and when an inguinal hernia has reached any size it is impossible to distinguish clinically between the external and internal varieties.

1625. A wax model of the lower part of the abdomen; on both sides the external oblique has been turned downwards, and the internal oblique and the transversalis muscle and fascia divided close above Poupart's ligament, so as to bring into view the deep epigastric artery. On each side is the sac of an internal inguinal hernia. On the right side the swelling is rounded and sessile; on the left the sac is longer and more pointed, and its extremity probably projected through the external abdominal ring. 2570

1626. A wax model of a right inguinal region, the tendon of the external oblique being turned downwards, and the internal oblique upwards, so as to lay open the inguinal canal. Two small hernial sacs are shown lying both within the canal, the necks being separated by the deep epigastric artery. The only coverings remaining on the sac of the external hernia are the transversalis fascia and subperitoneal tissue; the internal hernia has, in addition, a partial covering at its inner side furnished by the conjoined tendon of the internal oblique and transversalis muscles. 4853

1627. A wax model of a left inguinal region and adjoining parts. Occupying the inguinal canal (which has been laid open in the usual way) are the sacs of two hernial protrusions, one of which is situated internally, the other externally to the deep epigastric vessels. The sac of the external hernia has not descended along the canal, and is considerably smaller than the direct, which projects through the external abdominal ring. An incision has been made into the coverings of the sac of the internal hernia, probably the fascia transversalis and subperitoneal tissue conjoined. The sac appears to have passed downwards immediately to the outer side of the conjoined tendon without receiving any covering from it. 2563

1628. A wax model of a right inguinal region, the parts being dissected to show a small internal inguinal hernia. The external oblique and superficial coverings of the sac have been turned downwards, the internal oblique upwards and inwards; the conjoined tendon is stretched over the hernial sac. The deep epigastric artery passes upwards on the outer side of the neck of the sac, and to the outer side of the artery is the spermatic cord. 2557

1629. A wax model of the parts concerned in a large internal inguinal hernia. The tendon of the external oblique muscle has been partially turned outwards and downwards, and the internal oblique upwards, to show the internal abdominal ring, which is unoccupied by the hernial protrusion. The deep epigastric vessels are recognisable in the groove between the hernial sac and the internal abdominal ring. The hernia has passed through the external abdominal ring into the scrotum. 2559

1630. The lower part of an anterior abdominal wall, with the sacs of two internal inguinal herniæ, dried after injection of the blood-vessels. The sacs are oval in form and of nearly equal size. The neck of each is but slightly constricted. The epigastric artery is situated externally to the neck of each sac, around the outer margin of which it forms a shallow curve. 4499

FEMORAL HERNIA.

A femoral hernia escapes from the abdomen at the inner side of the femoral vessels in the internal compartment of the femoral sheath or *femoral canal* (1631). The upper extremity of the femoral canal or *femoral ring* is bounded by Gimbernat's ligament on the inner side, Poupart's ligament and the deep femoral arch in front, the external iliac vein externally, and the hip-bone covered by the pectineus muscle with its fascia behind. In its descent the hernia receives the following coverings:—1, the subperitoneal tissue; 2, the femoral sheath (these two are usually blended together, and form the so-called "fascia propria"); 3, the cribriform fascia stretching across the saphenous opening in the fascia lata; and 4, the superficial fascia and integument. The hernia commonly contains small intestine and omentum, and is usually of small size. After escaping from the saphenous opening the hernia as it enlarges turns upwards and comes to lie over Poupart's ligament (1632). The seat of strangulation is usually the sharp edge of Gimbernat's ligament, which is divided in the operation for its relief. The obturator artery, instead of taking its usual course, may arise from the deep epigastric, and may then take one of three courses to reach the obturator canal. Most commonly the artery passes backwards on the outer side of the femoral ring close to the external iliac vein (1639); but it may pass backwards across the ring, or, less frequently, it arches over the femoral ring and passes downwards along the edge of Gimbernat's ligament. In the latter situation the artery is in danger of being wounded in dividing Gimbernat's ligament in a strangulated hernia (1640). In very rare instances a hernia has been found passing under Poupart's ligament in other situations than through the femoral canal (1686).

1631. A wax model of the parts concerned in a right femoral hernia, the femoral vessels being injected. The femoral canal has been laid open to exhibit a small hernial sac; in the sac is a portion of intestine, apparently only part of the circumference of a coil, much congested, and which was probably strangulated. 2556

A hernia of this size in a stout subject would be difficult to detect by external examination.

1632. A wax model of a left inguinal region with the upper portion of the thigh, a superficial dissection having been made of the parts. Projecting from the saphenous opening is a coil of congested intestine, which has been exposed by the removal of the sac and coverings of a femoral hernia. The intestine lies immediately above the internal saphenous vein, which is represented unnaturally full of blood, as though compressed by the protrusion. The intestine, after emerging from the opening, has risen upwards over the inner part of Poupart's ligament. 2565

1633. A wax model of the parts concerned in a small femoral hernia of the right side. Immediately below the hernial sac are several lymphatic glands, enlarged by inflammation, one of which has suppurated and lies exposed and granulating at the bottom of an ulcer in the skin. 2566

The hernia was concealed during life by the enlarged lymphatic glands.

1634. A wax model of the upper part of a right thigh, the integument and superficial fascia having been removed. Projecting from the saphenous opening is an oval mass of fat in the position of a femoral hernia. 2558

There is no history to the specimen, but it is probable that the fatty mass has resulted from an increase in the layer of subperitoneal fat covering a small hernial sac.

1635. The sac and some of the coverings of a small femoral hernia. Except at its fundus the sac is surrounded by a thickened layer of subperitoneal fat. 3550

1636. The parts concerned in a femoral hernia of the right side. The sac of the hernia has been laid open and turned back so as to expose a coil of small intestine and a portion of omentum which lies in front of it. The sac, as well as its contents, are healthy in appearance. 4850

1637. The sac and contents of a small femoral hernia which was strangulated. An incision has been made into the sac to expose the intestine. The portion strangulated includes the whole circumference of the intestine, apparently without any portion of the mesentery; over its surface a thin layer of exudation has been deposited. Upon the exterior of the sac is a nodulated layer formed by the subperitoneal fat. The sac is applied closely to its contents. 3546

The specimen was taken from an old woman, in whom a sudden descent and strangulation of the intestine occurred. In operating, the sac so closely resembled intestine as at first to deceive Mr. Liston. The symptoms were relieved. On the next day the signs of strangulation returned, and continued to increase in spite of active treatment, and death took place on the third day. After death it was found that the intestine had re-descended and become strangulated.

1638. The upper border of the anterior half of a left hip-bone, with Poupart's ligament and the sac of a small femoral hernia, dried. Above the sac of the hernia is a loop of small intestine, from which a pouch-like portion projects into the sac: the projecting portion is about the size of a filbert, and occupies the upper half of the sac, to which it is firmly adherent; it communicates with the rest of the intestine by a narrow neck, through which a piece of whalebone has been passed. 3709

From a subject brought into the dissecting-room. It is probable that the specimen is one of hernia of a Meckel's diverticulum.

1639. The parts concerned in a small femoral hernia of the right side, dried after injection of the blood-vessels. The sac of the hernia, most of which has been removed, fills the femoral canal, the femoral artery and vein lying to its outer side. The obturator artery arises by a common trunk with the deep epigastric, and passes between the external iliac vein and the neck of the sac directly downwards to the obturator canal. The epigastric artery passes nearly horizontally inward above the neck of the sac, a result apparently due to the shrinking of the parts in drying; and for the same reason the iliac vessels have been considerably displaced outwards. 2693

1640. A dried preparation of part of a right hip-bone, together with the lower part of the aponeurosis of the external oblique muscle, including Poupart's and Gimbernat's ligaments, and parts of the external iliac and femoral vessels injected. The obturator artery arises from the deep epigastric, and after arching forwards and inwards at the lower border of Poupart's ligament passes along the free edge of Gimbernat's ligament on its way to the obturator canal. 4552

The parts were removed from a subject in whom there was a femoral hernia, the sac of which has been removed. An obturator artery in such a position is in danger of division in the operation for strangulated femoral hernia.

1641. A wax model of the left inguinal region and upper part of the thigh of a male subject, the parts being dissected to show the sac of a small femoral hernia and an abnormal origin of the obturator artery. The obturator artery arises from the deep epigastric, and passes backwards on the outer side of the neck of the hernial sac between this and the external iliac vein, and would have been out of danger in an operation on the hernia. The abdominal muscles have been cut away, so as to show the epigastric artery passing beneath the edge of the rectus. The external pudic artery lies immediately below the sac. 2869

1642. The parts concerned in a femoral hernia of the right side, dissected, and the vessels injected. The hernia is small and the anterior part of the sac has been removed. The latter is thickened and its inner surface is covered with a layer of inflammatory exudation. A small knuckle of intestine projects into the upper part of the sac; there is a free opening into it, in which the apertures leading to the upper and lower parts of the intestine are indicated by pieces of coloured glass rod. The neck of the sac measures only 1 cm. in diameter, so that the two parts of the loop of intestine which are contained within it are tightly constricted. The distended bowel on the proximal side of the hernia has been filled with wool, and the contrast between this part and the contracted bowel on the distal side of the hernia is very striking. 7229

From a woman, aged 70, in whom the symptoms of strangulation were of 5 days' duration. At the operation the bowel was gangrenous; Gimbernat's ligament was notched and the intestine opened. Vomiting continued after the operation, but nothing escaped from the artificial anus until the 5th day, when there was a very free discharge of liquid fæces. Vomiting then ceased, but the patient gradually sank and died on the 8th day. Commencing peritonitis was found at the *post mortem* examination. (Surg. Reg. Rep. 1894, p. 128, No. 985.)

Obturator Hernia.

An obturator hernia escapes from the abdomen through the obturator canal. The latter is about 3 cm. in length, and in the upright position of the body is directed downwards with an inclination forwards and very slightly inwards; it is bounded in front by the superior ramus of the pubic bone and behind by the obturator muscles and the obturator membrane. The pelvic opening of the obturator canal is rounded, and will just admit the end of the little finger; it is distinctly larger in the female than in the male; its curved posterior (inferior) border is formed by the obturator fascia turning over the border of the obturator internus muscle to join the edge of the obturator membrane. In the obturator canal the artery occupies a position behind the nerve and vein, whilst the nerve is external to the vessels.

Obturator hernia is very rare; most of the cases occur in elderly, and often emaciated, women. The hernial tumour is usually small, and, being deeply situated beneath the pectineus muscle, may be very difficult to detect during life.

The sac usually contains a knuckle of small intestine, often including a part only of the circumference (1643); less commonly the ovary or Fallopian tube, with part of the broad ligament, has been found in the hernia.

The obturator artery usually lies to the outer and posterior aspect of the sac

(1643), and the pressure of the sac upon the obturator nerve explains the pain extending to the knee, which is sometimes a prominent symptom (1643, 1644).

In a strangulated obturator hernia the constriction should be divided in a direction backwards and inwards. i.e. same as femoral

1643. The greater part of a left hip-bone, with the parts concerned in an obturator hernia. The sac of the hernia is transversely oval and 1·5 cm. in its longer diameter; it does not project beyond the edge of the superior ramus of the pubic bone. The sac is invested with a layer of subperitoneal fat about 2 mm. in thickness.

The obturator nerve lies at the outer side of the sac; the obturator artery has divided within the canal, and its two primary branches are seen emerging at the posterior and outer aspect of the sac behind the nerve; the anterior pubic offset of the inner branch is crossing below and to the inner side of the neck of the sac. The sac lay beneath the pectineus muscle, and above the upper edge of the obturator internus. As seen from within, the neck of the sac is narrow, and occupied by a knuckle of small intestine. By the protrusion of the peritoneum the bladder has been partially displaced, its margin lying near the neck of the hernial sac.

The patient, a man aged 50, of good general health and regular habits, was suddenly seized, whilst moving about his room, with a feeling of sickness and faintness, a sinking at the epigastrium, and dragging pain at the umbilicus. The pain gradually grew worse, shooting from the point at which it commenced to the left groin and along the inside of the left thigh. It did not affect the testicle or extend beyond the knee. He was obliged to flex the thigh in order to relieve the pain. He had made no effort before the pain came on, but had been seized with a fit of coughing. There was no vomiting. On the second day he passed a dark-coloured motion; vomiting set in, which in a few hours became stercoraceous, and continued up to the termination of the case. The pain became more diffused over the abdomen. On the fourth day the face was pale and anxious; there was frequent stercoraceous vomiting and no action of the bowels; the abdomen was distended, tense and tender; the pulse 120 and irregular. No tumour or hardness could be felt in any part of the abdomen or at any of the hernial orifices; digital examination of the rectum afforded no indication. There was doubtful fulness at the upper part of the left thigh. On the seventh day the patient gradually became collapsed without any material change in the symptoms, except that tenesmus came on, and he died quietly on the following day.

At the *post mortem* examination there was found to be no general peritonitis. The piece of gut in the sac of the obturator hernia was so loosely held that great care was required to keep it in position during the removal of the specimen. It was scarcely congested, and the whole circumference of the gut was not included.

1644. Part of a right hip-bone and the parts concerned in an obturator hernia. The greater part of the hernial sac has been removed by operation after the application of a ligature; the remainder of the sac lies in the obturator canal behind the superior ramus of the pubic bone. The two divisions of the obturator nerve emerge from the canal at the outer aspect of the hernia and have been reflected. The obturator artery lies below and to the inner side of the nerve and divides behind the hernia into its inner and outer branches, while the anterior pubic offset of the former passes up on the inner side of the hernia. On the pelvic aspect of the specimen it will be seen that the layers of the broad ligament have been widely separated and flattened against the wall of the pelvis. The hernial sac is formed from the part of the parietal peritoneum lying between the round ligament and the suspensory ligament of the ovary. A second smaller pouch has been drawn into the obturator canal from the broad ligament between the Fallopian tube and the ovary. 7710

From a woman, aged 59, who was admitted into U. C. H., under the care of Mr. Godlee, in 1896. The symptoms began 9 days before admission with pain in the right knee, followed by pain in the abdomen; the bowels did not act after the onset and there was repeated vomiting. On admission the abdomen was distended and the coils of intestine were visible; there was a tender rounded fulness in the right groin. A vertical incision was made at the inner part of Scarpa's triangle, the adductor longus was separated from the pectineus, and a few fibres of the adductor brevis divided. The sac lay beneath the latter muscle; it was opened and congested bowel exposed. The bowel was reduced and the sac ligatured. Death occurred on the following day. At the *post mortem* examination there was general peritonitis; the intestine which had been strangulated was adherent around the obturator foramen. The strangulated portion involved rather more than half the circumference of the bowel and was gangrenous. (Surg. Reg. Rep. 1896, p. 112, No. 2708.)

1645. Part of the pelvis of a male subject, in which on each side a peritoneal sac projects into the obturator canal, that on the right side being the larger. The obturator nerve on each side lies at the outer aspect of the sac. The mouth of the sac is, on each side, small and rounded. The hernial contents have been removed. 5884

The herniæ were discovered after death in a man who died from other causes. They were occupied by intestine.

UMBILICAL HERNIA.

An umbilical hernia may be congenital, and is then the result of imperfect closure of the anterior abdominal wall. In such cases the sac is very thin and the umbilical cord is continuous with it. The sac most commonly contains intestine (1647), but almost all the abdominal viscera may be included (1646). In those cases in which the vitelline duct persists as a Meckel's diverticulum, the inclusion of the latter in ligature of the umbilical cord may result in a fæcal fistula (1648).

Umbilical hernia is very common in early infancy, and results from yielding of the umbilical scar; this form is nearly always followed by spontaneous cure.

In adult life umbilical hernia is much more common in women than men. The hernia often reaches a very large size, and the only recognisable covering is the skin, which becomes thinned and adherent to the peritoneal sac (1653). The natural dimple of the umbilicus can often be seen at the upper or lower part of the hernial tumour (1652). Omentum, small intestine, and transverse colon are the most common contents, but every viscus, except the pancreas, has been found in the sac. An umbilical hernia is frequently irreducible, partly from the formation of extensive adhesions (1653), and partly from the accumulation of fat in the omentum or mesentery (1651, 1652).

1646. Part of the anterior abdominal wall of an infant, with part of the sac and the contents of a congenital umbilical hernia. The hernial tumour is globular, and projects for a distance of 7 cm. through a rounded opening in the abdominal wall, 7 cm. in diameter. At the margin of the opening the skin of the abdominal wall is continued for a short distance on to the base of the hernia, the covering of which in the rest of its extent is smooth on the surface and presents near the most prominent part the ligatured umbilical cord. The hernial sac contains parts of the large and small intestine, the liver, right kidney, and part of the stomach. In some places the coils of intestine in the hernia are united one to another by firm adhesions, and the contents, including the liver, are at many parts adherent to the sac.

1647. A congenital umbilical hernia. The sac is globular, and measures 4·5 cm. in diameter. The wall of the sac is membranous, except at the neck, where the skin of the abdominal wall is prolonged for a short distance on to it. In the wall of the upper aspect of the sac the umbilical cord can be traced as a thickening for a distance of 3 cm. and then leaves the sac. A considerable part of the small intestine occupies the sac.

From a child who died 24 hours after birth.

1648. Part of the abdominal wall of the umbilical region, with a loop of ileum and part of a diverticulum adherent to the abdominal wall. The interior of the diverticulum opens externally at the umbilicus by a small circular aperture in the integument; the edges of the aperture are shelving, and appear to have been granulating. The peritoneum lining the abdominal wall is coated with a thin layer of exudation.

From a male child 15 months old. From birth there had existed a small fistulous opening at the umbilicus, from which fæcal matter occasionally escaped. At the seat of the aperture was a vascular fungating mass of granulations, in the centre of which was an opening through which a probe could be passed towards the right iliac fossa for three or four inches. The fungous mass was removed, and the edges of the opening pared and brought together. The child died two or three days afterwards from peritonitis. (Mr. Marshall's *Case-book*, 1870.)

1649. The sac of a small umbilical hernia, with the adjoining part of the abdominal wall, the skin and subcutaneous tissues having been removed. The sac is slightly constricted at its neck, where it is thickened and corrugated; the wall of the sac and the peritoneum lining the abdominal wall present similar changes. Except over the fundus, the sac is surrounded by a well-defined lobulated layer of adipose tissue, apparently formed by the subperitoneal fat; over the fundus of the sac this layer is wanting. 721

1650. Part of the anterior abdominal wall from the region of the umbilicus, in which is an aperture 5 mm. in diameter, through which a hernial protrusion occurred. The sac, except for a small portion of its base, has been cut away. The peritoneum forming the neck of the sac is thickened and opaque, and the aperture at the umbilicus itself has a wrinkled edge. 722

1651. Part of the anterior abdominal wall of an adult, together with an irreducible umbilical hernia, in sagittal section. At about the middle the hernial tumour is surrounded by a deep furrow; behind this the thin skin covering the hernia has been removed, whilst in front of it the coverings are intact, but the skin has lost its normal appearance and is quite smooth. The subcutaneous fat of the abdominal wall has a maximum thickness of 4·5 cm. On the surface of the section is seen a coil of small intestine, which occupies the most prominent part of the hernia and is inseparably adherent in front to the sac and behind to a solid mass of fat (probably mesenteric) which completely fills the rest of the sac. 5979

1652. A sagittal section of an irreducible umbilical hernia. The neck of the sac measures 1·5 cm. in diameter and the body of the sac measures 5·5 cm. vertically. The anterior surface of the hernia, which projects very little beyond the surface of the abdominal wall, is covered with normal skin, and at the lower part the position of the umbilicus is indicated by a deep transverse furrow. The anterior part of the sac is intimately connected with the overlying skin, and the interior of the sac is completely filled by a mass of consolidated omentum, which is in parts adherent to the sac-wall. From the lower part of the sac, immediately beyond the neck, a secondary extension of the hernia, the sac of which is ill-defined, extends into the subcutaneous fat, and, like the rest of the sac, is filled with omentum. The subcutaneous fat around the hernia is abundant. 8408

From a woman, aged 48, who died of bronchitis. (Dr. Poore's *Case-books*, Females, 1900, p. 377.)

1653. A sagittal section of an irreducible umbilical hernia. The neck of the sac has a diameter of 3·5 cm. and the body of the sac a vertical measurement of 9·5 cm. At its upper part the hernial tumour rises gradually from the surface of the abdominal wall, but between its lower border and the abdominal wall there is a deep furrow; its exact relation to the umbilicus is not recognisable. The anterior part of the sac is intimately connected with the overlying skin, which is deeply pigmented, except over the most prominent part of the sac, where it is pale and very thin. The interior of the sac is occupied by a coil of small intestine and a mass of omentum, which are intimately adherent one to the other and to the wall of the sac. The subcutaneous fat is abundant. 7830

From a woman, aged 43, under the care of Dr. Jackson of Barnsbury. The hernia gave rise to no symptoms.

1654. A narrow elliptical portion of the abdominal wall in the umbilical region, together with the globular sac of a small umbilical hernia, in sagittal section. The mouth of the sac is situated at the upper part of the hernia. The peritoneum forming the sac is thickened; the skin covering the hernia is deeply pigmented, and between it and the sac, except at the fundus, a layer of dense fibro-fatty tissue can be recognised. 7356

From a woman, aged 28, in whom abdominal section was successfully performed for a large tumour of the omentum.

1655. A small part of the anterior abdominal wall in the umbilical region in sagittal section immediately to the right of the middle line. Beneath the peritoneum on the posterior aspect of the specimen are seen the obliterated hypogastric arteries and a lobulated layer of fat. A part of the latter protrudes through a small opening in the linea alba and forms a lobulated fatty mass which occupies a depression in the subcutaneous fatty layer. 5759

VENTRAL HERNIA.

Ventral hernia is the term applied to any external protrusion not escaping at one of the natural apertures of the abdominal wall. It may occur spontaneously or may follow the weakening of the abdominal wall resulting from operations (1658) on the abdominal cavity, penetrating wounds, or abscess-formation. Small fatty herniæ are not uncommon in the linea alba; they consist of subperitoneal tissue and may contain a central peritoneal pouch.

1656. The parts concerned in a ventral hernia. The hernial protrusion has occurred in the middle line. The sac of the hernia appears to have been of a compressed globular form, about 6 cm. in diameter; the peritoneum forming it is unaltered in appearance; its neck is circular and about 2 cm. in diameter. The sac is occupied entirely by a deeply folded thickened mass of omentum, which is not adherent to the interior of the sac. 720

1657. A wax model of a large ventral hernia. The hernia is extended in the transverse direction, and measures 21 cm. across, and slightly less from above downwards. Inferiorly it overlaps the labia. Its form is slightly lobular, adapted to the coils of intestine and the omentum within it. 4028

From a lunatic patient of intemperate habits. The integuments over the swelling were very thin, and the peristaltic movements of the contained intestines could be clearly discerned. The hernia was of fifteen years' standing.

1658. Part of the sac and coverings of a ventral hernia, together with a piece of the ileum removed by operation and the sutured bowel removed *post mortem*. The hernial sac is rounded in outline, 11 cm. in diameter, and covered with deeply pigmented skin. Near the middle of the hernia there is an oval opening in the sac and its coverings, around which the skin is ulcerated. This opening was the orifice of a fæcal fistula communicating with the portion of ileum preserved in the specimen. The latter is about 7 cm. in length and the opening in it is situated on its lateral aspect. The portion of bowel in which end to end suture has been performed is coated around the line of suture with a layer of inflammatory exudation and in parts is grey. 6930

From a woman, aged 50, in whom ovariotomy had been performed 15 years previously. The hernia appeared 2 years after the operation and for 1 year the fæcal fistula had been present. The hernia was situated in the middle line and occupied the lower half of the space between the umbilicus and pubes, a median scar extending from its upper border to the umbilicus. The discharge from the fistula had only a faintly fæcal odour and charcoal given by the mouth appeared in it within 2 hours. The operation consisted in the removal of the hernial sac with its coverings and of the short piece of ileum concerned in the fæcal fistula; the bowel was united by simple suture. Death occured on the 6th day from suppuration in the wound and localised intraperitoneal suppuration extending into the pelvis. (Mr. Barker and Mr. Godlee's *Case-books*, 1892, vol. i, p. 383.)

DIAPHRAGMATIC HERNIA.

This may arise from a congenital defect in the diaphragm, or as the result of a wound of the diaphragm from a stab, or from fractured ribs. The congenital form is more common on the left than the right side and is often associated with other malformations (1659, 1662); the protruded viscera lie free in the pleural cavity (1659). Diaphragmatic hernia resulting from traumatism is extremely rare, and is also more common on the left than the right side; the protrusion most commonly consists of part of the stomach.

1659. The thorax with its contents and some of the abdominal viscera from a fœtus of full term, showing a diaphragmatic hernia due to a congenital malformation of the diaphragm. Almost the whole of the small intestine lies in the left pleural cavity, passing through an oval opening in the left half of the diaphragm, which measures nearly 3 cm. in its longer transverse diameter. Immediately below this opening lie the spleen and the cæcum with the termination of the small intestine. The liver is normal. In the right half of the diaphragm there is an opening in the muscular tissue, through which the right suprarenal body, covered on its upper surface by pleura, projects into the thorax. The greater part of the pericardium has been removed. The muscular septum of the ventricle is incomplete. The lungs are unexpanded, the left being very small. Two arterial branches arise from the arch of the aorta; one of these divides into the two carotids and the other is the left subclavian. The right subclavian artery arises from the posterior aspect of the aorta at the junction of the arch and descending portion, and ascends behind the œsophagus to reach its normal position above the right first rib. 2880

1660. The trunk of a male fœtus of full term, the anterior thoracic and abdominal walls having been removed in order to display a diaphragmatic hernia on the right side. There is a large opening in the posterior part of the right half of the diaphragm, through which a considerable part of the right lobe of the liver and numerous coils of small intestine with the cæcum and ascending colon project into the right pleural cavity. The heart is displaced to the left and the lungs are unexpanded. The testicles are undescended.

1661. The trunk of a new-born male child, the anterior walls of the thorax and abdomen having been removed to display a diaphragmatic hernia on the right side. There is a large oval opening in the posterior and outer part of the right half of the diaphragm, through which part of the right lobe of the liver and the intestines, except part of the jejunum and the large intestine below the ascending colon, project into the right pleural cavity. The projecting part of the liver lies in front of the intestine and has only a thick membranous attachment to the rest of the right lobe. The lungs are unexpanded, the right one being extremely small. 6483

1662. The trunk of a male fœtus, from which the anterior body-wall together with the greater part of the diaphragm, has been removed. The fundus of the stomach lies in the thoracic cavity, and is enclosed by a sac of peritoneum (part of which has been cut away), the neck of which occupies the œsophageal opening. The left kidney is represented by a flat fibrous mass 17 mm. long. The rectum is imperforate and the distended large intestine terminates at the level of the brim of the pelvis in a fibrous cord intimately adherent to the posterior surface of the bladder. The abdominal aorta ends in two vessels of unequal size; the right is the larger and is continued as the hypogastric artery, whilst the left terminates in external and internal iliac branches. 5582

1663. The trunk of a male fœtus, from which the anterior thoracic and abdominal walls have been removed. There is a large opening in the left half of the diaphragm, through which part of the liver, the stomach, small intestine, spleen, ascending and transverse colon project into the left half of the thorax, displacing the heart to the right side. The lungs are small and unexpanded. The right testicle is undescended. 6612

STRANGULATED HERNIA.

A hernia is strangulated when there is such a want of proportion between the size of the protrusion and that of the opening through which it passes that the circulation through the contents of the hernia is interfered with. Strangulation most commonly results from a sudden increase in the contents of an already-existing hernia produced by a forcible contraction of the abdominal muscles; much less commonly the hernia is formed and strangulated by one and the same violent effort. If, as is most commonly the case, the strangulation concerns a knuckle of intestine, the lumen of the latter is blocked and intestinal obstruction results.

The constriction producing the strangulation may be formed by the neck of the hernial sac or by some structure external to it, such as Gimbernat's ligament. The changes resulting from the strangulation of intestine vary. In rare cases the constriction is sufficient completely to arrest the circulation at once. In these circumstances there is no effusion of fluid into the sac and the gut remains pale. In most cases, however, the pressure at first is sufficient only to obstruct the venous return. In consequence of this venous congestion the gut becomes dark red or almost black in colour and swollen, whilst serous fluid, often blood-stained, is effused into the sac. Unless the strangulation be speedily relieved the damaged intestine becomes inflamed and the formation of a layer of inflammatory exudation on its surface destroys the polish of the serous coat (1664). Finally, with the increasing swelling of the bowel, the circulation is completely arrested, and if this condition be maintained sufficiently long gangrene sets in and the colouring-matter of the blood begins to undergo changes and to soak out of the gangrenous part. The colour of the gut then changes from dark red or purple to ash-grey (1666); it becomes soft and sodden and may finally break down into a pulpy mass of slough.

Intestine which has been strangulated is often marked by a deep indentation at those parts which have been in contact with the constricting ring (1671). Occasionally after reduction perforation may take place at the site of these indentations; or the healing of the ulcerated mucous membrane may lead to stricture (1682).

In cases which have terminated fatally without relief of the strangulation the gut above the obstruction is found to be full, dilated, and congested, while that below is empty, contracted, and pale (1669). In the rare condition known as *partial enterocele*, only a part of the circumference of a knuckle of intestine is strangulated (1667, 1674); after reduction in such a case the strangulated segment appears as a pouch on the unattached aspect of the bowel, and perforation is very likely to occur in the groove surrounding the base of the constricted part (1674).

If a strangulated hernia be not relieved by taxis or by operation, the patient almost invariably dies. Recovery may, however, take place in rare cases with the formation of an *artificial anus*. In order that this may occur, the gut must be sufficiently tightly nipped to cause gangrene. Firm adhesions then form between the intestine within the abdomen and the mouth of the sac. The strangulated portion sloughs, and suppuration takes place about it, ending in the formation of an abscess, which bursts externally, and the fæces find a way to the surface.

Artificial anus more frequently results from a strangulated hernia which has been treated by operation and in which the gut, being found gangrenous, has been opened and left *in situ* (1678).

Considerable success has followed the treatment of strangulated hernia in which the bowel is actually gangrenous, or apparently hopelessly damaged, by immediate enterectomy (1679, 1683).

1664. Some of the parts concerned in a small femoral hernia, the hernial sac being for the most part removed. The entire circumference of the intestine lay within the sac, but without its mesentery, and the intestine has been tightly constricted at the neck of the sac. The surface of the intestine is covered with a layer of inflammatory exudation. The contrast between the bowel above and that below the obstruction is well marked; the former (on the right side) is distended, the latter (on the left side) is empty and contracted. 714

1665. Some of the parts concerned in a femoral hernia of the right side. The sac of the hernia, except its neck, has been removed. The intestine which it contained consists of a small loop with part of the mesentery. The intestine presents no appearance of inflammation, and is in all respects similar to that within the abdomen. Lying to the outer side of the hernia are the femoral artery and vein. 4149

The patient, a female, had all the symptoms of strangulated femoral hernia, and apparently died from exhaustion from persistent vomiting.

In the MS. Catalogue it is observed that the specimen illustrates well how death from strangulated hernia may arise from other causes than gangrene of the intestine.

1666. A portion of ileum, part of which was strangulated in a hernial sac. The strangulated portion includes about 4 cm. of the intestine, the marks of the constriction being still plainly discernible on it. The coats of the strangulated part are swollen and more opaque than the healthy intestine, and are of a slate-grey colour from congestion. Its surface, as well as that of the mesentery supporting it, is covered with a layer of inflammatory exudation. The intestine on the proximal side of the obstruction is dilated. 2273

1667. A portion of small intestine, a part of which was strangulated in a small femoral hernia. The strangulated part includes a portion only of the circumference of the intestine (partial enterocele) and takes the form of a projecting sacculus, the base of which is sharply marked off from the rest of the bowel by a well-defined constriction. The strangulated part of the intestine is coated with a thin film of exudation; in several spots it is thin and transparent from ulceration of its coats, its wall being in these places formed only by peritoneum. 717

From the same case as No. 1686.

1668. A wax model of the lower part of an abdomen and of a strangulated inguinal hernia on the right side. There is intense inflammation in the abdominal cavity and in the hernial sac, the serous membrane being everywhere covered with a thick layer of yellowish inflammatory exudation. 2857

The patient refused any operation.

1669. A wax model of the lower part of an abdomen, the abdominal wall being turned downwards to expose the intestine. On the right side a portion of the small intestine is represented passing into the femoral canal, and strangulated in the sac of a femoral hernia. The portion of the small intestine on the distal side is closely contracted, but otherwise natural; the intestine above the constriction, for a considerable distance, is distended and much congested. There is no evidence of peritonitis. 2538

1670. A wax model, probably from the same case as the preceding specimen. The bowel above and below the hernia is represented as laid open to display the congested state of the mucous membrane in the bowel above the hernia. 730

1671. Wax models of portions of small intestine, the intestine in one of the models being represented laid open. A small loop of the intestine was strangulated in a hernial sac, and is much congested. There is inflammatory exudation on the surface of the adjoining portion. The seat of constriction is marked by a deep groove at either end of the strangulated piece. 4370

1672. Wax models of the cæcum and part of the ascending colon of a child, the colon in one of the models being represented laid open. The parts shown were strangulated in a hernia, and are much congested. The mucous membrane of the colon is very dark from extravasation of blood. The vermiform appendix is not congested. 729

1673. A wax model of the lower part of the left side of an abdomen, the abdominal wall with a piece of omentum, probably adherent to the neck of a hernial sac, being turned downwards; parts of the small intesine and the sigmoid colon are thus exposed. At one spot the small intestine was ruptured by a blow, when strangulated in an inguinal hernia. The ruptured part, which is deep purple, has been withdrawn from the sac, and is shown lying within the abdomen. A slight extravasation of fæcal matter has occurred in the immediate neighbourhood, and appears to have been confined by recent adhesions amongst the coils of the intestine. 2861

The rupture was followed by great increase of pain. Peritonitis immediately supervened.

1674. A portion of small intestine, a part only of the circumference of which was strangulated in a femoral hernial sac (partial enterocele). The strangulated part of the bowel forms a distinct projection on the unattached border and is marked off at its base by a slight groove. The wall of the strangulated portion is swollen and its surface roughened by inflammatory exudation. In the groove at the base of the strangulated portion there is an oval perforation 7 mm. in its longer diameter. 6812

From a woman, aged 68, who was admitted into U. C. H., under the care of Mr. Beck, Jan. 23, 1892, for strangulated femoral hernia. No history was obtainable. Operation was at once performed, Gimbernat's ligament divided, and the bowel reduced. Death occurred during an attack of vomiting before the patient had recovered from the anæsthesia. (Mr. Beck's *Case-books*, 1892, vol. i, p. 242.)

1674 A. A small portion of the sigmoid colon, on which is a pouch which occupied the sac of a left inguinal hernia. The wall of the pouch is greatly thickened, and attached to it is a considerable mass of fat, on the surface of which some of the appendices epiploicæ are recognisable. On opposite sides of the pouch-like dilatation of the bowel are two perforations, through which it is transfixed by a narrow strip of bone 5 cm. in length.

From a man, aged 74, who was admitted into the Richmond Hospital, under the care of Mr. Law, on Sept. 15, 1879. On the preceding day a left inguinal hernia, which was believed to have existed for 3 years, became irreducible; there were frequent slight actions of the bowels with nausea, but no vomiting. Operation was performed and the piece of bone, which protruded through the sac, was withdrawn; the sac was opened and two small perforations detected in the adjacent pouch of large intestine which it contained; a drainage-tube was inserted into the sac. Death occurred 79 hours after the operation, with commencing general peritonitis. The part of the bowel which occupied the sac had an appearance exactly like a diverticulum on the sigmoid colon. ('Lancet,' 1880, vol. i, p. 643.)

1675. The parts concerned in a small femoral hernia of the right side, dried. As a result of strangulation, gangrene of a loop of small intestine occurred, leading to the formation of an artificial anus. The upper part of the intestine, recognisable by its greater size, is lying above the pubes; opposite the neck of the sac this portion of the intestine opens, after becoming much narrowed, into a small cavity within the abdomen, which communicates by an aperture about 1 cm. in diameter with the interior of the hernial sac, the greater part of which has been removed. The other end of the intestine opens in the opposite side of the cavity. A bougie has been passed through the two openings, between which a portion of the intestine appears to have been completely destroyed. Another coil of intestine is firmly adherent to the walls of the cavity above noticed.

1676. Part of a right hip-bone, together with the parts concerned in the formation of an artificial anus in connection with a strangulated femoral hernia. The openings into the two parts of the coil of intestine which was in the hernia lie side by side; that which opens into the upper part of the intestine, and through which the intestinal contents were discharged, is marked by a piece of white glass rod; the opening into the lower part of the bowel, marked by a piece of red glass, is surrounded by slightly prolapsed mucous membrane. On the abdominal aspect of the specimen the difference in the size of the two portions of the loop of intestine is well shown. Suppuration appears to have occurred along the line of Poupart's ligament, the situation of the abscess being indicated by pieces of green glass rod. 5469

There is no history to the specimen.

1677. A specimen illustrating the formation of an artificial anus in connection with an inguinal hernia of the sigmoid colon. The two parts of the loop of intestine open separately on the surface of the skin, one above the other. The lower opening is small and leads into the contracted bowel below the artificial anus; the upper opening is much larger and surrounded by slightly prolapsed mucous membrane, and is the opening through which the intestinal contents were discharged. In the neighbourhood of the artificial anus the sigmoid colon is loosely adherent to the parietal peritoneum. The testicle, which presents a small hydrocele, is in a position of retroversion.

There is no history to the specimen, but the artificial anus probably resulted from an operation for gangrenous hernia.

1678. Part of the right side of the trunk of a male infant, illustrating the formation of an artificial anus in connection with a strangulated inguinal hernia. The artificial anus involves the lower end of the ileum; the lower of the two openings in the abdominal wall is that through which the intestinal contents were discharged. The ileum above the artificial anus is dilated, whilst the ascending colon, cæcum, and the short length of ileum between the latter and the artificial anus are contracted. The vermiform appendix is adherent by its extremity to the dilated ileum above the artificial anus. 6618

From an infant, aged 6 weeks, in whom the hernia had been strangulated probably for 6 days. At the operation it was found that a gangrenous patch in the intestine had ruptured; the edges of the opening in the gut were stitched to the skin-wound. The artificial anus acted freely, but the child wasted and died on the 35th day. (Surg. Reg. Rep. 1891, p. 330, No. 2647 (1890).)

1679. A loop of small intestine, measuring 31 cm. in length, removed by operation in a case of strangulated hernia. The site of strangulation is situated near the middle of the loop, and whilst the bowel above this point is dilated and discoloured by congestion, that below is pale and contracted. The strangulated portion, which included nearly the whole circumference of the bowel for an extent of 3 cm., but no part of the mesentery, presents a distinct pouch-like dilatation on the unattached aspect; in its present condition this portion is darker in colour than the rest of the bowel, swollen, and incompletely covered by a yellowish layer of inflammatory exudation. 8572

From a woman, aged 22, who was admitted into U. C. H., under the care of Mr. Barker, on July 8, 1900. For several years she had worn a truss for a right inguinal hernia, and symptoms of strangulation had developed two days before admission. On opening the sac the gut was found to be gangrenous, the strangulation being caused by a constriction at the middle of the sac. The piece of bowel preserved in the specimen was removed, and end to end anastomosis performed with simple suture. Death occurred on the 3rd day from peritonitis, due to gangrene of the wall of the bowel around one of the sutures in the proximal segment. (Mr. Barker's *Case-books*, 1900, vol. i, p. 361.)

1680. A coil of small intestine removed by operation in a case of strangulated hernia. The mesentery has been divided close to its attachment to the bowel. In its present condition the intestine has a normal appearance, except at one part, where it is slightly discoloured and presents small deposits of inflammatory exudation on its serous coat. 8318

From a man, aged 20, who was in U. C. H. under the care of Mr. Barker in 1899. The hernia occupied the right side of the scrotum, and symptoms of strangulation had existed for four days before the patient's admission to the hospital. On opening the hernial sac, the intestine was found to be bluish-black in colour, swollen and nearly lustreless. The portion of intestine preserved in the specimen was excised, and end-to-end anastomosis performed with simple suture. The patient made an uninterrupted recovery. (Surg. Reg. Rep. 1899, p. 128, No. 1249.)

✓ **1681.** A piece of small intestine 37 cm. in length removed by operation in a case of strangulated hernia. The strangulated part involves about half only of the circumference of the intestine for a length of 3 cm., and forms a distinctly bilobed projection from the aspect of the bowel opposite to the attached border. The strangulated part, which was gangrenous, is coated with a layer of inflammatory exudation. The contrast between the swollen and slightly distended condition of the bowel above the seat of the strangulation contrasts strongly with the contracted bowel below. 8201

From a woman, aged 30, who was admitted into U. C. H., under the care of Mr. Barker, on March 23, 1899. On March 20 a sudden attack of pain in the right groin led to the detection of a femoral hernia. On admission the vomiting was stercoraceous and the skin over the hernia was red and œdematous. Local anæsthesia was induced by infiltration with 1 in 1000 solution of eucaine, and herniotomy performed; the portion of bowel preserved in the specimen was excised and end-to-end anastomosis effected with a Murphy's button. On the 5th day after the operation symptoms of intestinal obstruction again developed, and on the 6th the abdomen was opened and the segment of bowel containing the button excised, after establishing lateral anastomosis with another button. Death occurred a few hours after the operation. (Mr. Barker's *Case-books*, 1899, vol. i, p. 290.)

1682. A piece of small intestine, measuring 94 cm. in length, removed by operation. At a distance of 23 cm. from one extremity the bowel presents a sharp twist in its longitudinal axis, the position of the twist being indicated, in the natural position of the parts, by a deep sulcus, above which the bowel presents a well-marked pouch-like dilatation. In its present condition the two parts of the kinked intestine have been forcibly separated and the bowel accidentally torn, thus displaying a tight stricture measuring only 6 mm. in diameter. The portion of bowel above the stricture is uniformly larger than that below and its wall distinctly thicker. In almost the whole length of the specimen the surface of the intestine is irregularly covered with tough fibrous adhesions. 8580

From a woman, aged 39, in whom an operation was performed for a strangulated femoral hernia on July 1, 1900; the bowel, which was congested and œdematous, was reduced. The patient left the hospital on July 16, and immediately commenced to suffer from attacks of cramp-like abdominal pain. On Sept. 8 a severe attack occurred, attended with collapse and abdominal distension; the bowels were irregular, constipation alternating with diarrhœa, and there was much flatulence. On Oct. 15 the patient was re-admitted and abdominal section performed. The bowel preserved in the specimen, which was extensively adherent, was excised, and end-to-end anastomosis by simple suturing performed. The patient did well and left the hospital on Dec. 19. (Mr. Barker's *Case-books*, 1900, vol. i, p. 211.)

1683. A piece of small intestine, 152 cm. in length, removed by operation from a case of strangulated ventral hernia. The mesentery has been divided near its attachment to the bowel. The strangulated portion is swollen and dark red in colour; the valvulæ conniventes are infiltrated, and in places stained nearly black by extravasation. 8639

From a woman, aged 76, who was admitted into U. C. H., under the care of Mr. Barker, on Jan. 10, 1901. She had undergone ovariotomy in 1870 and for 2 years had had a large ventral hernia in the ovariotomy scar. Symptoms of strangulation began 2 days before admission, the hernial tumour becoming tender and larger than usual. The contents of the hernia were only partly reducible. The abdomen was opened through the old scar, and about a pint of blood-stained fluid with a fishy odour escaped. A coil of small intestine about 3 feet in length was found to be strangulated through the omentum; the piece of bowel preserved in the specimen was removed and end-to-end anastomosis performed with continuous silk sutures. The lower part of the abdomen was filled with uterine fibroids. The patient's convalescence was interrupted by bronchitis and she left the hospital on April 2. (See Barker, Med. Chir. Trans. vol. lxxxiv, 1901, p. 181.)

1684. Part of the ileum in which end-to-end anastomosis was performed after the excision of the artificial anus resulting from a gangrenous strangulated hernia. The position of the anastomosis is indicated by a slight narrowing of the bowel, but the line of suture is almost hidden by a layer of inflammatory exudation. Some of the sutures in the mesentery can be seen. 6447

From a woman, aged 44, in whom symptoms of strangulation of a left femoral hernia had been present for 4 days before her admission into U. C. H. Herniotomy was performed and the gangrenous intestine opened. On the 16th day the artificial anus was excised and end-to-end anastomosis performed by simple suture. Death occurred on the 5th day from strangulation of a lower portion of the ileum which had escaped into the deep part of the wound. (Surg. Reg. Rep. 1889, p. 258.)

1685. A large piece of omentum, which was removed in an operation for strangulated inguinal hernia. The omentum is stained dull reddish brown from congestion; it is still readily unfolded, and is loose and unaltered in texture. 5049

SPECIMENS ILLUSTRATING THE CAUSES OF DEATH AFTER APPARENT REDUCTION OF A STRANGULATED HERNIA.

After the apparent reduction of a strangulated hernia the symptoms may not be relieved from various causes, the chief of which are the following:—1. The hernia reduced may not have been the cause of the symptoms, a smaller and undetected rupture being the real cause of death (1686). 2. The gut may have been so injured during the time it was strangulated that, after reduction, it could not perform its functions. 3. The strangulation may have been caused by adhesions, as of omentum, at the neck of the sac, and thus be not relieved by reduction of the hernia. 4. In some very rare cases there has been an intussusception of some of the gut included within the sac. 5. If there should be an adhesion between a small piece of the gut and the neck of the sac, it is said that the gut may be so bent upon itself after reduction as to prevent the passage of fæces. 6. Reduction *en masse* (1688). By this is meant reduction of the sac and its contents together into the abdomen. This is, of course, only possible when the seat of strangulation is the thickened neck of the sac; it is very rare and has been met with chiefly in inguinal herniæ. A more common condition is a partial reduction of the hernia *en masse*, possibly of gradual occurrence, so that the sac assumes an hour-glass form, part within and part outside the cavity of the abdomen. The contents may then be squeezed from the outer to the inner sac, and apparent reduction effected, while the real seat of strangulation is at the neck of the sac some distance within the abdomen. Another form of this condition is displacement of the neck of the sac into the abdominal cavity, with rupture of the body of the sac immediately below, so that the contents of the hernia are forced into the subperitoneal areolar tissue. 7. The gut may be ruptured by accidental or intentional violence, and reduced in this state (1673). Fæcal extravasation then occurs, causing fatal peritonitis.

1686. Part of the abdominal wall of the right inguinal region, together with the sacs of a small oblique inguinal and a small femoral hernia. The sac of the inguinal hernia is 3 cm. in its longest diameter; it has been exposed by the removal of part of the aponeurosis of the external oblique muscle. The neck of the sac measures nearly 2 cm. in diameter, and beneath the peritoneum at its lower and outer part is seen the round ligament. The sac of the femoral hernia is flask-shaped, and is 4 cm. in length; the neck is only 3 mm. in diameter. The femoral hernia does not occupy the usual position in the femoral canal; the outer border of its neck is separated from the femoral vein, for a distance of 1 cm., by a mass of fat. The hernia appears to have descended through Gimbernat's ligament below the edge of Poupart's ligament. 716

The history of the case is incomplete. The patient, a woman, presented the symptoms of strangulated hernia and a hernia in the right groin was reduced by taxis. The symptoms were not relieved, and a small tumour not larger than a cherry could be felt under Poupart's ligament; by gentle means this was reduced, but the patient died the same evening. It is thus probable that in the first instance only the inguinal hernia was detected, whilst the strangulated femoral hernia was left unreduced. The intestine, which was strangulated, is preserved in No. 1667.

1687. The sac of a small inguinal hernia, with part of the adjacent peritoneum, spermatic cord and testicle, and a portion of omentum, the latter being adherent by a delicate fibrous band to the peritoneum, which forms the posterior wall of the base of the sac. The peritoneum forming the neck of the sac is thickened and opaque. The tapering portion of the omentum, which gives attachment to the cord of fibrous tissue, appears to have lain within the neck of the sac, its folds being closely packed and consolidated, and contrasting with the loose floating part above.

By the withdrawal of the omentum from the sac, the posterior wall of the latter has been drawn upwards, so as to give the band the appearance of having been attached to the neck of the sac. 710

1688. A dried specimen of the parts concerned in an oblique inguinal hernia of the left side, showing a partial reduction of the hernia *en masse*; the external oblique has been turned downwards. The hernial sac lies almost entirely within the cavity of the abdomen and presents at its upper part the rounded opening of the neck, which measures nearly 2 cm. in diameter. In its lower part the sac occupies the inguinal canal, but in the present condition of the parts it does not extend beyond the external abdominal ring. The external iliac vessels lie on the deep aspect of the outer part of the sac.

W. M., aged 47, a labourer, was admitted into U. C. H. Dec. 21, 1870. He had been ruptured 16 years, but had never had any difficulty in reducing the rupture, and had worn a truss regularly. On Dec. 18 the hernia came down during a violent fit of coughing, and vomiting soon began. On Dec. 20 a medical man partly reduced the hernia by taxis, but without giving any relief. On admission at 4 P.M. on Dec. 21 the patient was very weak and ill; temp. 98°·6; pulse 100 and thready; belly distended and tympanitic. There was œdema and redness from the anterior superior iliac spine to the pubes, reaching a hand's breadth above and below Poupart's ligament. In the lower part of the inguinal canal was a swelling as large as a walnut, tense, oblong, tender, and without distinct impulse. Chloroform was administered, and the hernia was apparently reduced without great difficulty. There was no gurgle as it went back, but immediately afterwards a small swelling reappeared, which went back with gurgling. The symptoms were not relieved, and the patient died on Dec. 24.

P.M.—All the viscera except those concerned in the hernia were healthy; the tissues covering the sac were œdematous and discoloured; the part of the sac external to the abdominal ring was as large as a small egg, and contained some omentum, behind which lay a coil of gut. On opening the abdomen a tumour as big as a small orange was seen in the subperitoneal tissue of the left inguinal region. This was formed by a large part of the sac which had been pushed back into the abdomen. The neck of the sac lay at least one and a half inch within the abdomen. Through the neck passed the whole of the omentum twisted up into a sort of rope, and a coil of gut about four inches in length. The gut was gangrenous, but the omentum seemed almost unchanged. The gut and omentum tensely filled the internal part of the sac, which contained scarcely any fluid. There was one small adhesion between the omentum and the sac. There was slight general peritonitis. (Mr. Marshall's *Case-books*, 1870–71, vol. i, p. 171.)

1689. The sac and contents of a small inguinal hernia of the left side, a considerable part of the sac having been cut away in order to display the contents. The latter consists of a knuckle of small intestine which is still strangulated beneath a rounded fibrous cord, which passes from one part of the neck of the sac to another, and beneath which a piece of glass rod has been placed. The intestine in the sac is partly covered by a thin layer of exudation and presents a large rounded perforation. 5781

From a man, aged 59, who was admitted into U. C. H., under Mr. Berkeley Hill, in 1882. He had had a left inguinal hernia for 9 years. Symptoms of strangulation began 3 days before admission. Taxis had been tried for 15 minutes before the patient came to the hospital, and after his admission chloroform was administered and the hernia apparently reduced. Vomiting continued, and 36 hours later intense abdominal pain with distension set in. Death occurred on the 5th day after the onset of the symptoms. At the *post mortem* examination the bowel was found still strangulated, as shown in the specimen; there was general peritonitis. The strangulated knuckle of intestine was dark purple in colour and had perforated in the sac. (Surg. Reg. Rep. 1882, p. 122, No. 932.)

INTERNAL STRANGULATION OF THE INTESTINES.

Internal strangulation of the intestines may arise from a variety of causes.

1. Strangulation through apertures in the mesentery (1691) or omentum (1690). Such apertures are probably either congenital or the result of injury.
2. Strangulation by bands resulting from localised peritonitis (1694). The chief causes of such a localised peritonitis are appendicitis, tuberculous ulceration of the intestine, tuberculous disease of the mesenteric glands, pelvic peritonitis, and abdominal operations.
3. Strangulation by adherent omental bands (1695) and, in rare instances, by an adherent vermiform appendix, appendix epiploica, or Fallopian tube.
4. Strangulation by a Diverticulum ilei (Meckel's diverticulum) (1696–1700). The diverticulum is an unobliterated portion of the vitelline duct, and is given off from the ileum usually on the side opposite to the attachment of the mesentery. Its situation is most frequently between 3 and 4 feet (90–120 cm.) from the termination of the ileum, but it varies from 1 to 10 feet. Its length is commonly from 2 to 3 inches. The variety chiefly concerned with the production of internal strangulation is that in which the hollow diverticulum ends in a fibrous cord, which may retain its attachment to the inner aspect of the umbilicus, or the free end of the cord may acquire secondary adhesions elsewhere.
5. Strangulation in an internal hernia. The chief forms of internal hernia are:— (*a*) Hernia into the duodeno-jejunal fossa (retroperitoneal hernia); (*b*) Hernia into the intersigmoid fossa; (*c*) Herniæ into the pericæcal fossæ; and (*d*) Hernia into the foramen of Winslow.

In internal strangulation the effects on the bowel are essentially similar to those following strangulation in an external hernia, except that the parts concerned are entirely contained within the cavity of the abdomen. The strangulated part is nearly always in the small intestine. Actual gangrene of the bowel is rare.

1690. Several coils of small intestine, with the corresponding part of the mesentery, strangulated in a fissure of the omentum. The aperture in the omentum is oval and about 26 mm. in its longer diameter. In one or two situations, on both the strangulated parts and those not strangulated, are distended lacteal vessels. The mesentery occupying the aperture is twice folded on itself. The texture of the omentum is not apparently altered, but it is rather abundantly loaded with fat. The portion of intestine which has passed through the fissure in the omentum does not appear to have been tightly strangulated; small shreds of exudation are present on it.

1691. A piece of mesentery in which is a circular aperture 3 cm. in diameter. Through the aperture passes a coil of large intestine, probably the transverse colon, together with part of the great omentum. The omentum and the mesocolon are extensively adherent to the edge of the opening in the mesentery, and the omentum is converted into a number of irregular bands. 2091

The intestine is said to have been strangulated.

1692. Part of a hernial sac, together with a portion of firmly adherent omentum which occupies it. In connection with the lower aspect of the neck of the sac is a dense fibrous ring through which several coils of small intestine are tightly strangulated.

There is no history to the specimen.

1693. A coil of the lower extremity of the ileum tightly strangulated beneath a rounded fibrous band 4·5 cm. in length, which is attached at its two extremities to a piece of mesentery. The strangulated piece of intestine and its mesentery are in parts coated with a thin layer of inflammatory exudation. 4150

1694. Part of a cæcum, together with the lower part of the ileum and another short piece of the small intestine. Two separate fibrous bands are attached to the latter at a distance of 2·5 cm. apart. The longer and cord-like band is attached by its other extremity to the ileum near the mesenteric border; the shorter and more membranous band ends in the mesentery of the ileum close to the attachment of the other band. A loop of the ileum has passed between the two bands and is tightly strangulated over the longer band. 4595

1695. A small part of the abdominal wall of the umbilical region. Attached to the posterior aspect of the abdominal wall at the position of the umbilicus and between the upper ends of the obliterated hypogastric arteries is a flattened band of omentum. 4845

Such an omental band may be a cause of strangulation of the intestine.

1696. Part of the small intestine of a child strangulated by a Meckel's diverticulum. The diverticulum springs from the intestine opposite the mesenteric border, and at a distance of 5·5 cm. from its commencement ends in a rounded fibrous cord, the extremity of which is attached to the mesentery. The diverticulum and the cord in which it terminates together encircle the loop of intestine, passing horizontally two and a half times around it. The mesenteric glands are swollen. 1686

1697. Several coils of small intestine strangulated by a Meckel's diverticulum and a fibrous band connected with it. The diverticulum is at first almost as large as the intestine itself, but gradually tapers into a fibrous band. The diverticulum and the band together make two complete turns around the two parts of the loop and slightly constrict them. The end of the band passes between the two pieces of intestine at the point of constriction and is attached to the mesentery. The intestine on the proximal side of the constriction is dilated. The constricted parts are unaltered in appearance. 5295

1698. A cæcum with part of the ileum, the latter having been strangulated close to its termination by a fibrous cord connected with a Meckel's diverticulum. The diverticulum arises from the ileum 78 cm. above the ileo-cæcal valve and is equal in diameter to that of the bowel from which it springs; it is irregularly curved, 16 cm. in length along its convex border, and has a blind, contracted, free extremity. Attached to the surface of the diverticulum, 2·5 cm. from its free end, is a stout round fibrous cord, 3·5 cm. in length, which crosses the ileum close above its termination and spreads out to be attached to the bowel and its mesentery. At this position the ileum is drawn upon and tightly constricted by the cord which crosses it. The whole of that part of the ileum preserved in the specimen is dilated; especially in the part nearest the seat of strangulation the bowel and its mesentery are partly covered by a layer of inflammatory exudation. 7243

From a man, aged 45, who was admitted into U. C. H., under the care of Dr. Roberts, on July 4, 1894, severely ill with bronchitis. On the previous night the patient had complained of severe pain at the pit of the stomach. On admission the patient was collapsed and cyanosed; the abdomen was not distended, but the abdominal wall was resistant; the bowels acted and there was no vomiting. On July 6 the patient was bled to 8 ounces and the cyanosis somewhat relieved; there was no sickness. On July 6, at 3.30 A.M., the patient died suddenly after an attack of stercoraceous vomiting. (Dr. Roberts's *Case-books*, 1894, Males, vol. ii, p. 83.)

✓ **1699.** The cæcum with part of the ileum of a child, the latter being strangulated by a fibrous cord attached to the extremity of a Meckel's diverticulum. The diverticulum arises from the ileum 56 cm. above its termination; it is 6 cm. in length, rather larger in diameter than the vermiform appendix, and has a truncated blind extremity. Beneath the diverticulum passes a coil of empty bowel. Viewed from behind, a fibrous cord, 3·5 cm. in length, is seen arising from the extremity of the diverticulum. The cord crosses first a coil of distended ileum without constricting it, and next passes over another coil to be attached to the mesentery close to the origin of the diverticulum itself. At this point the bowel is tightly constricted, being dilated on one side of the band and contracted on the other side. There is no evidence of inflammation of the surface of the intestine. 8600

From a boy, aged 11, who was admitted into the Victoria Hospital for Children on Nov. 17, 1900. On Nov. 15 the boy went to school in the morning feeling quite well; during dinner he had an attack of severe pain in the abdomen followed by sickness, but he went again to school in the afternoon. In the evening and during the night he was again sick several times. On Nov. 16 the abdominal pain persisted; an enema was given with good result; there was constant vomiting. When admitted into the hospital at 3.45 P.M. on Nov. 17 the child was collapsed and repeatedly vomited dark-coloured fluid; no operation was performed, and death occurred 3 hours after admission.

1700. A coil of ileum, together with a Meckel's diverticulum arising from it. For a distance of 3 cm. the diverticulum is tubular and about 1 cm. in diameter; beyond this it is distended into an ovoid cyst measuring about 7·5 and 5·5 cm. in its two chief diameters. The serous surface of the cyst is irregularly coated with a layer of inflammatory exudation. The tubular portion of the diverticulum is obliquely grooved as the result of a twist in its long axis. There is no evidence of obstruction of the bowel in the part preserved in the specimen. 6767

From a woman, aged 19, who was admitted into the Burton-on-Trent Infirmary, under the care of Mr. Philip B. Mason, on July 24, 1891. Five days previously she had eaten largely of black currants and the next day had a violent action of the bowels followed by abdominal pain and symptoms of complete intestinal obstruction. On admission the patient's face was flushed and the tongue dry and furred; the abdomen was slightly distended, but not tender; the temperature was 96° and the pulse 90. Enemata were given, and small doses of tincture of belladonna. At 1 A.M. on July 25 a pint of fæcal matter was vomited. At 10 P.M. abdominal section was performed; the small intestine was distended and one coil was found twisted upon itself and almost black. The twist was thought to be the cause of the obstruction; the bowel was punctured to relieve the distension, and the puncture ligatured with catgut; the abdomen was closed. Death occurred 12 hours after the operation. At the *post mortem* examination the dilated diverticulum, which was attached to the ileum 45 cm. above its termination, was found wedged in Douglas's pouch and pressing a coil of small intestine against the promontory of the sacrum so as to obstruct it. ('Lancet,' 1891, vol. ii, p. 1165.)

INTUSSUSCEPTION OF THE INTESTINES.

Intussusception, which is most commonly met with in young children, is formed by the invagination of a portion of the intestine into the part immediately below. A tumour is thus formed in which the following layers can be recognised:—Externally is the *ensheathing tube* in its normal position, but usually much puckered at its upper part; within this is the *reflected tube*, turned inside out so that its mucous membrane is in contact with that of the ensheathing tube; and within this again is the *entering tube* in its normal position, its peritoneal surface being in contact with that of the reflected tube (1703). The ensheathing tube is the *intussuscipiens*; the entering and reflected tubes together form the *intussusceptum*. The mesentery belonging to the entering and reflected tubes is in the space between their surfaces. The increase in length of an intussusception takes place by fresh portions of the ensheathing tube becoming turned inside out, the apex of the intussusceptum remaining unaltered.

The circulation in the intussusceptum is obstructed, and the strangulated part becomes swollen and, later, inflamed; inflammatory exudation is thrown out, which glues the upper part of the sheath to the portion of intestine immediately above the intussusception, as well as the serous surfaces of the entering and reflected tubes, one to the other. If the strangulation be sufficiently complete, the whole intussusceptum may slough and be passed by the bowel (1710), the patient occasionally recovering. Sometimes the ensheathing tube also becomes gangrenous and perforated (1706).

By far the most common variety of intussusception is the *Ileo-cæcal* (1703). In this the intussusception begins at the ileo-cæcal valve*, which forms the apex of the intussusceptum even though the latter advance so as to protrude from the anus. The vermiform appendix lies between the entering and reflected tubes. A less common form is the *Enteric* (1706), in which the intussusception is confined to the small intestine. Still more rare forms are:—(1) *Colic* (1704), in which the intussusception concerns only the large intestine; (2) *Ileo-colic*, in which the small intestine prolapses through the ileo-cæcal valve into the large intestine; (3) *Cæcal*, in which the intussusception begins in the caput cæcum; and (4) *Invagination of the vermiform appendix or a diverticulum ilei* into the cæcum or ileum respectively.

Chronic forms of intussusception are occasionally met with, especially in the large intestine, in which the signs of strangulation are wanting. They may be caused by a tumour of the bowel (1712).

In the *post mortem* examinations of young children it is not uncommon to find a number of short intussusceptions in the small intestine, which are easily reduced and occasionally occur in an upward instead of a downward direction. They are supposed to be due to irregular peristaltic movements occurring at the time of death (1716).

1701. Portions of the large and small intestine, showing an intussusception of the small into the large for a distance of about 10 cm. The middle portion, or reflected tube, is transversely sacculated, and is evidently formed by cæcum and ascending colon. The innermost portion appears to consist entirely of small intestine, the apex of the intussusceptum corresponding in all probability with the ileo-cæcal valve. The opening of the advancing part is directed towards the mesenteric attachment. The mucous membrane of the reflected tube is swollen, and apparently covered with a layer of exudation; the mucous membrane of the ensheathing tube is unaltered; so far as can be seen, no adhesions have occurred between the apposed peritoneal surfaces at the upper part of the intussusception. 2195

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* In order to avoid an alteration in the nomenclature of the different varieties of intussusception, the name *ileo-cæcal valve* has been used instead of the more strictly accurate name *ileo-colic valve*.

1702. Portions of the small and large intestine of a child, the lower part of the ileum with the cæcum and part of the ascending colon being concerned in an intussusception. Near the lower end of the intussusception the ensheathing and reflected layers have been divided; through the opening is visible a pouch-like protrusion, apparently the cæcum inverted, and to the bottom of this is connected the vermiform appendix. The intussuscepted intestine was deeply congested. 3573

1703. The parts concerned in an intussusception of the small into the large intestine, the ensheathing and reflected layers having been laid freely open so as to display the entering tube and the vermiform appendix. In its whole length the invaginated part is somewhat curved, the concavity corresponding with its mesenteric attachment, and the upper part of the reflected tube is deeply folded. Between the apposed peritoneal surfaces of the intussusceptum slight adhesions have formed, and the parts are deeply blood-stained from congestion; in places extravasation has occurred.

The glands of a portion of the mesentery shown at the upper part of the preparation are much enlarged.

From a child, 8 months of age, under the care of Dr. Ringer. The symptoms were continued vomiting and slow escape of blood by the rectum. The invaginated portion of intestine could be felt about two inches above the anus. Injection of warm water was tried without success; insufflation reduced the invaginated parts for about two inches. The child died on the third day after admission. After death the small intestine was found much distended; there was no peritonitis. The cæcum and ascending colon were absent from their natural position. There were no adhesions at the upper part of the invagination, and some care was necessary to prevent the unrolling of the parts during the examination.

1704. Part of the large intestine concerned in an intussusception. About 36 cm. of the transverse are invaginated into the descending colon. The ensheathing layer has been laid open; there is an ulcerated aperture in the reflected tube 5 cm. in diameter. The peritoneal surface of the sheath and of that part of the entering tube which is exposed in the perforation of the reflected tube are coated with a thin layer of exudation. 3545

The specimen was obtained from a woman who had been recently confined, and had sufficiently recovered to send away her nurse. On the following day she had severe diarrhœa, which ceased in the evening. To this succeeded violent vomiting, which after a few days became stercoraceous. In spite of all attempts to relieve the obstruction no evacuation could be obtained, and the patient died fourteen days after the first appearance of the symptoms.

1705. Part of the small intestine concerned in an intussusception, the sheath having been laid open in order to expose the intussusceptum. The latter presents a well-marked curvature with its concavity directed towards the mesentery, and is about 8 cm. in length. 6584

1706. The lower part of an ileum, with the cæcum and vermiform appendix. In the ileum an intussusception has occurred. In the outer layer of intestine a large ulcerated aperture exists, through which the lower 5 cm. of the intussuscepted portion protrude; in one situation the edge of the opening is everted. The mucous membrane of the extruded portion is in process of disintegration by ulceration and sloughing. A short distance above the aperture described, the outer layer of intestine presents two smaller oval openings placed across its axis close together, and each about 5 mm. in length. Below the two apertures the mucous membrane has at one spot been destroyed by ulceration, the wall of the intestine being here translucent and formed only by peritoneum. 2363

1707. Part of the ileum concerned in an intussusception, from an adult. The portion involved is tortuous and slightly swollen. The lower, free end of the intussuscepted part has been exposed by an incision in the ensheathing layer.

About 5 cm. above the lower end of the intussusceptum the sheath presents an oval ulcerated aperture about 1·5 cm. in length, through which the intussuscepted portion is exposed. 2298

1708. Part of the small intestine of an animal, in which an intussusception has occurred. Lying in the lumen of the intussusceptum and projecting from each end are some long irregular strands of tendinous substance.

The parts appear to have been neither congested nor inflamed. 1525

1709. Part of the ileum of a child in which an intussusception has occurred. The sheath has been freely laid open in order to expose the intussusceptum. The reflected layer of the latter has also been opened in order to display an unusual fold between the reflected and entering tubes; the two layers of this fold lie with their mucous surfaces in contact, and at the upper part the outer layer is continued into the reflected tube of the intussusceptum and the inner layer into the sheath. The extra fold is 2·5 cm. in length, and reaches downwards to within 2 cm. of the apex of the intussusception. 2195

Double and even triple intussusceptions are occasionally met with and result from secondary invaginations of the sheath. In this specimen, however, the extra fold appears to have resulted from an infolding of the ensheathing and reflected layers at their point of union into the space between the reflected and entering layers.

1710. A piece of intestine about 68 cm. in length. It consists of an irregular narrow strip, probably of small intestine, and of a larger, in parts tubular, portion, extensively fenestrated and evidently large intestine. The mucous membrane is darkly stained by altered blood and in part of the specimen the mucous surface is directed outwards. 1438

The portion of intestine preserved in the specimen was separated by sloughing in an intussusception and subsequently evacuated by stool from a child, who completely recovered.

1711. Parts of the small intestine of a child, in whom an intussusception was removed by operation. At the upper part of the specimen is the piece of bowel, 22 cm. in length, which formed the intussusceptum, the invagination of which has been reduced; in the half of its extent which formed the entering tube, the bowel is swollen but contracted, and its serous surface is partly covered with a layer of exudation; in the other half, which formed the reflected tube, the bowel is swollen and dilated. In the lower part of the specimen is the coil of intestine from within which the intussusceptum was removed; at one place the bowel is surrounded by a continuous Lembert's suture, and immediately below this the bowel is occupied and slightly distended by the remaining proximal part of the intussusceptum; at a slightly lower level a longitudinal incision, 6 cm. in length, along the free border of the intestine has been closed by a continuous Lembert's suture. At a distance of 7 cm. above the circular suture there is a small polypus in the intestine. 6744

From a boy, aged 12, who was admitted into U. C. H., under the care of Mr. Barker, in Oct. 1891. Two days before admission he was seized with sudden abdominal pain; castor-oil was given and the bowels acted. On the following day a slimy motion, mixed with blood, was passed and vomiting occurred twice. On the 3rd day vomiting continued and the bowels did not act. On admission the abdomen was moderately distended and in the right lower quadrant a long oval movable tumour could be felt. The abdomen was opened in the middle line below the umbilicus and the intussusception of the small intestine withdrawn; it could not be reduced. A longitudinal incision was made into the intussuscipiens and the intussusceptum drawn through it; the greater part of the latter was excised after uniting the two layers composing it by a ring of sutures. The little finger could then be passed through the lumen into the bowel above the intussusception. The incision in the intussuscipiens was then closed with a continuous Lembert's suture and the bowel returned. The operation caused severe shock and death occurred in 14 hours. At the *post mortem* examination it was found that the intussusception was situated within 3 feet of the duodenum. The polypus of the intestine did not appear to be concerned in the production of the intussusception. (Surg. Reg. Rep. 1891, p. 101, No. 2035.)

1712. The parts concerned in an ileo-cæcal intussusception occasioned by the growth of a columnar carcinoma of the ileo-cæcal valve; a large part of the sheath formed by the large intestine has been removed in order to expose the intussusceptum, and the latter has been divided by a longitudinal section. The intussusceptum is 24 cm. in length; the lumen of the entering tube is nearly filled, in its lower part, by a No. 12 English catheter. At the apex of the intussusceptum is seen the section of the tumour of the ileo-cæcal valve; from the apex the growth extends on the convex aspect of the intussusceptum for a distance of 3 cm., and on the concave for double this distance. The growth, commencing in the mucous membrane, has in parts destroyed the muscular coat and attains a maximum thickness of 1·5 cm.; its surface is cauliflower-like. In the intussusceptum along its convex aspect is a solid deposit, 3·5 cm. in maximum thickness, between the entering and reflected layers; this deposit is composed of dense fibro-fatty tissue, in which are seen the sections of several lymphatic glands, which are evidently infiltrated with new growth. 5592

From a man, aged 56, who had been ill for a year, the chief symptoms being gradual emaciation, colicky abdominal pain, occasional vomiting, and diarrhœa with the passage of coffee-coloured stools. On admission into U. C. H. the patient was greatly wasted and a moderately firm, slightly movable, ill-defined mass could be felt in the left iliac fossa. Right lumbar colotomy was attempted, but the colon could not be found; 3 weeks later the abdomen was opened in the left linea semilunaris, and the growth in the large intestine exposed; the bowel was followed round to the right loin, where the colotomy-wound was reopened and the intestine attached to it. On the following day the gut was opened. The artificial anus acted fairly well, but offensive discharges continued to escape from the rectum. The patient gradually sank with much abdominal pain, and died 38 days after the operation. At the *post mortem* examination it was found that the artificial anus in the right loin was in the ileum. (Surg. Reg. Rep. 1881, p. 27, No. 84.)

1713. Part of the abdominal wall from the right lumbar region, in which is situated an artificial anus communicating with the ileum, together with part of the abdominal wall in which is a cicatrix in the lower part of the left linea semilunaris. 5592

From the same case as the preceding specimen.

1714. A cæcum, together with the lower part of the ileum, the ileo-cæcal valve being the seat of a carcinoma. The latter forms a lobulated mass completely surrounding the bowel, and greatly narrowing the lumen. The tumour projects prominently into the interior of the cæcum and is causing commencing intussusception of the small intestine into the colon. The small intestine is hypertrophied; the mucous membrane is thickened and extensively ulcerated; the ulcers are mostly limited to the mucous membrane, but several of them extend completely through the wall of the bowel. There is a considerable accumulation of fat in the mesentery of the ileum, and the surface of the intestine and mesentery is in parts coated with a layer of inflammatory exudation. 7813

1715. Part of an intussusception of the upper part of the rectum 5 cm. in length, caused by a carcinoma of the bowel, and removed by operation. The specimen consists of the two layers of the intussusceptum removed by circular division at the upper part, where numerous appendices epiploicæ are seen between them. At the apex of the intussusceptum is an irregular, slightly papillary growth, which nearly surrounds the bowel and causes great constriction of the lumen. On one aspect of the specimen the growth extends 2·5 cm. in the mucous membrane of the reflected layer. 6743

Microscopic Structure.—The tumour is a columnar-cell carcinoma.

From a woman, aged 56, who was in U. C. H., under the care of Mr. Barker, in 1891. On two occasions, 2½ years previously, blood was freely passed from the bowel. For 16 days before admission the patient experienced rectal pain and tenesmus; the bowels were constipated and small quantities of blood were passed. By rectal examination the intussusceptum, formed at its apex by a ragged growth, was felt 2½ inches above the anus. After stretching the sphincters the intussusceptum was drawn freely through the anus; it was excised, the two layers composing it being sutured circularly at the upper part; the prolapse was then returned. The patient did well and was discharged on the 19th day. (Surg. Reg. Rep. 1891, p. 108, No. 2043.)

1716. Part of the small intestine of a child, in which, at four situations, intussusception has occurred to a slight degree. The invagination at each situation is in the same direction, and is probably of an upper into a lower portion. All the parts have a natural appearance. 2058

There were no symptoms during life, and the condition doubtless arose either immediately before or at the time of death.

VOLVULUS OF THE INTESTINES.

In this condition a loop of bowel is obstructed by being twisted upon its mesenteric attachment; the two ends of the loop are blocked where one crosses the other, and the intervening part becomes congested and greatly distended with gas.

Volvulus is much more common in the sigmoid colon than in any other part of the bowel (1717); it may, however, involve the cæcum (1718) or the small intestine.

1717. A sigmoid colon distended and dried, the part having been concerned in a volvulus. The coil of bowel measures 90 cm. in length, and at its centre has a circumference of 50 cm. The coil forms a large U-shaped loop with limbs of unequal size; the distance between the ends of the loop, corresponding to the base of the mesocolon, being about 9 cm. 7016

From a middle-aged man, who was admitted into U. C. H. for intestinal obstruction. There was great abdominal distension and the obstruction was thought to be due to stricture of the sigmoid colon. Left lumbar colotomy was performed by Mr. Raymond Johnson; the colon was only slightly distended and but little fæcal matter escaped. The patient died unrelieved a few days later. At the *post mortem* examination it was found that the loop of the volvulus nearly filled the abdominal cavity, lying in front of the rest of the large intestine.

1718. A cæcum, together with the adjoining parts of the ileum and ascending colon, dried, the parts having been concerned in a volvulus. The cæcum is greatly distended. The ileum and ascending colon lie side by side, and before the parts were removed from the abdomen the two portions of bowel crossed one over the other, a distinct groove being still visible on the commencement of the ascending colon. 6616

From a man, aged 49, who had been ruptured on the left side for 25 years. On Oct. 29, 1900, he experienced sudden abdominal pain and could not quite reduce the hernia. On Oct. 30, continuous vomiting set in, the vomit being brown in colour and offensive in odour; the hernia was reduced with difficulty; the abdomen was distended. On Oct. 31 an enema was given without effect; at midnight the patient was admitted into U. C. H. under the care of Mr. Beck; he slept well and took milk without vomiting. On Nov. 1 the abdomen was tympanitic and considerably distended, especially below the umbilicus; the left half of the scrotum was occupied by a hernial sac which seemed to contain easily reducible fluid. At 1.30 P.M. the hernial sac was opened, several ounces of blood-stained fluid escaping; a finger passed freely from the sac into the abdomen, impinging upon tensely distended intestine; the incision was prolonged upwards into the abdominal wall and gradually lengthened to within an inch of the costal margin, and an enormously distended coil of bowel withdrawn; this proved to be the cæcum, twisted on itself from left to right; the twist was undone and the distension relieved by puncture with an aspirator-needle. The cæcum was next pushed across into the right iliac region, where a second incision was made and the cæcum sutured to its margins. The patient did not recover from the shock of the operation, and died 12 hours later. (Surg. Reg. Rep. 1890, p. 69, No. 2308.)

1719. A mesenteric cyst, together with the adjacent part of the small intestine, laid open, from a case of volvulus of the entire mass of small intestine. The whole cyst presents a lobulated outline, resulting from the several intercommunicating spaces of which it is composed. The cyst measures 9 cm. in the line of the axis of the bowel, which is intimately connected with its surface, and it projects on both aspects of the mesentery. It contained clear fluid. 6583

From a boy, aged 10, who was admitted into U. C. H., under the care of Mr. Pollard, in 1890. Fifteen months previously the patient had an attack of abdominal pain and vomiting, lasting a day or two. Two days before admission, whilst returning from school, he was seized with severe pain in the region of the umbilicus; a dose of rhubarb was given; repeated vomiting followed; the bowels acted for the last time the same evening, and no flatus was passed subsequently. On admission, at 6 P.M. on the third day of the illness, the child was in a collapsed condition; the abdomen was opened and the cyst preserved in the specimen at once brought into view; the small intestine was congested and swollen, and appeared to be twisted on the mesenteric attachment; by turning the small intestine *en masse* in the direction of the hands of a clock the twist appeared to be undone; the intestine was returned and the abdomen closed. Death occurred from shock. At the *post mortem* examination the small intestine was found to be swollen and congested, the contiguous coils being glued together by exudation; a half-twist of the mesentery was found to be still unravelled.

It is probable that the twist of the mesentery was occasioned by the heavy, pendulous mesenteric cyst. (Surg. Reg. Rep. 1890, p. 68, No. 2406.)

FOREIGN BODIES IN THE INTESTINES.

The most important of these, as an occasional cause of intestinal obstruction, are gall-stones (1720, 1720 B), which, having found their way into the intestine from the gall-bladder by ulceration, are most commonly arrested in the ileum.

Among the occasional constituents of intestinal concretions may be mentioned phosphate of lime, medicinal substances (such as magnesia), and vegetable matter (such as occurs in the so-called "oat-stones" or "oat-hair balls").

1720. A large cylindrical gall-stone, together with fifteen smaller facetted stones. The large stone presents a facet at each extremity, and from its larger end part of the surface of the stone has been broken away; it measures 3·3 cm. in length, and has a maximum circumference of 9·6 cm. The stone weighs over 19 grammes. 8679

From a woman, aged 50, who came under the care of Sir R. Quain, July 1877, for dyspepsia. In October slight hardness was detected in the right hypochondrium; there was no history of jaundice or of the passage of biliary calculi. On Feb. 4, 1878, she experienced pain in the left iliac region; the bowels acted freely; vomiting occurred in the evening. The vomiting soon became stercoraceous, and no further action of the bowels occurred. Death took place on Feb. 15. At the *post mortem* examination the large gall-stone was found obstructing the upper part of the ileum; the smaller stones were found, some in the gall-bladder and others in the upper part of the small intestine. The gall-bladder was extensively ulcerated, and communicated with the second part of the duodenum by an opening as large as a sixpence. (Barker, Trans. Path. Soc. 1878, vol. xxix, p. 142.)

1720 A. A gall-bladder and part of the duodenum, between which there is a fistulous communication resulting from the ulceration of a gall-stone into the intestine. The opening, which has contracted to a diameter of 6 mm., leads from the neck of the gall-bladder into the duodenum at a distance of 2 cm. beyond the pylorus. The gall-bladder is slightly contracted and thickened; it contains some grape-stones. 8949

1720 B. A large gall-stone, which caused intestinal obstruction, from the same patient as the preceding specimen. The gall-stone is irregularly elliptical; it measures nearly 6·5 cm. in length, and has a maximum circumference of 10 cm. It is darkly pigmented. 8949

From a woman, aged 61, who was admitted into U. C. H., under the care of Mr. Godlee, March 17, 1902. Until a week before admission the patient was in good health, and there was no history of jaundice; symptoms of complete intestinal obstruction then set in; the bowels did not act, there was repeated vomiting with griping abdominal pain. On admission there was fæcal vomiting, the abdomen was slightly distended; nothing abnormal could be felt in it. Abdominal section was performed and extensive adhesions found in the region of the gall-bladder; this region was explored, but no cause of intestinal obstruction detected. The small intestine and the large intestine as far as the lower part of the descending colon were moderately distended. Death occurred on the following day. The gall-stone preserved in the specimen was found blocking the small intestine at a point 10 feet above the ileo-cæcal valve; the bowel above the stone was swollen and congested; there was no peritonitis. (Mr. Godlee's *Case-books*, 1902, No. 524.)

1721. The lower part of an ileum, with part of the cæcum and the vermiform appendix; a piece of whalebone has been passed through the ileo-cæcal valve. The end of the small intestine is greatly dilated so as to have a circumference of about 11 cm.; its coats are thicker than normal, and the mucous membrane is healthy and thickly beset with villi. The ileo-cæcal opening is much constricted, and measures 6 mm. in width. The cæcum, as far as it is displayed, appears healthy. The lowest part of the ileum is folded upon itself, its apposed parts being perforated by a large oval aperture 2·5 cm. in diameter, close to the ileo-cæcal valve; the edges of the opening are smoothly rounded, and through it the two parts of the intestine are perfectly continuous, the margin of the aperture being covered by loose mucous membrane bearing villi, like that which lines the adjoining part of the intestine. Around this opening the apposed peritoneal surfaces of the ileum are adherent.

From a female patient under the care of Sir William Jenner, who had previously been in the hospital under Dr. Walshe for intestinal obstruction. She occasionally vomited, and passed *per anum* several cherry-stones. When admitted under Sir William Jenner she was greatly emaciated, and on palpation of the abdomen a distinct rattling could be heard. At the *post mortem* examination the colon was found closely contracted, and the cæcum extremely small. The vermiform appendix was adherent to the left side of the mesentery. The ileum was greatly distended, and its coats hypertrophied. In the lower portion of the ileum and in the cæcum were found upwards of a hundred cherry- and plum-stones. (Sir William Jenner's *Case-books*, Females, May 1863-64, p. 362.)

1722. The cherry- and plum stones from the preceding case. Some of them are thickly covered, wholly or in part, by a light, porous, pale brown substance composed of closely felted vegetable fibre.

1723. The largest of the concretions from the preceding case, in section. It is spherical, quite smooth on the surface, and has a distinctly laminated construction. No nucleus is now evident, but in its centre is a small irregular space. A microscopic examination shows the filamentous material to consist of short, stiff, vegetable hairs, the substance being in all respects identical with that forming the oat-hair balls common in Scotland and the northern parts of England. 5051

PERFORATED ULCERS OF THE INTESTINES TREATED BY SUTURE.

1724. Part of the lower end of an ileum, in which a perforated typhoid ulcer was closed by suture ten days before death. The position of the sutured ulcer is indicated internally by a glass rod, and externally by a row of silk sutures which are partly buried in a layer of inflammatory exudation. Other ulcers are present. 7573

From a girl, aged 16, who was admitted into U. C. H., under the care of Dr. Ringer, April 23, 1896, on the fourteenth day of typhoid fever. There was diarrhœa, but no blood in the motions. On May 5 vomiting, abdominal pain, and collapse occurred at 3 A.M.; at 9.30 A.M. the extremities were cold, and the abdomen was distended; liver-dulness was present. At 1.30 P.M. the abdomen was opened by Mr. Godlee; there was free gas in the peritoneum; a small perforation in the lower end of the ileum was closed by suture, and the peritoneum was flushed with saline solution and drained. The patient seemed to be doing well until May 12, when an attack of abdominal pain occurred. On May 13 the patient was collapsed, and she died on May 14. There was general peritonitis; the ulcer which had perforated was 6 inches above the cæcum, and there were a few other ulcers in its neighbourhood. (Mr. Godlee's *Case-books*, 1896, vol. i, p. 421.)

OPERATIONS FOR TUMOURS OF THE INTESTINES.

Operations for tumours of the intestines are chiefly concerned with columnar carcinoma of the large bowel. In favourable circumstances the tumour may be removed and the continuity of the bowel restored. In many cases the removal of the tumour is impracticable, and operation aims only at the relief of the resulting obstruction, by the formation of an artificial anus above the growth, or by establishing an anastomosis between the bowel above and that below the obstruction.

1725. A cæcum, together with the adjoining parts of the ileum and ascending colon, removed by operation for carcinoma of the cæcum and laid open. The growth, which has caused marked shrinking of the cæcum, presents an ulcerated surface from which irregular polypoid outgrowths project into the lumen. The part of the ileum preserved in the specimen is hypertrophied, its wall being considerably thicker than that of the ascending colon. There is a large accumulation of fat around the part of the bowel invaded by the growth. 8293

From a man, aged 30, who was admitted into U. C. H. on May 5, 1899, on account of colicky abdominal pain of about three months' duration, with increasing constipation and occasional vomiting. On May 7 Mr. Barker opened the abdomen below the umbilicus, and found the small intestine greatly distended; about 5 pints of liquid fæcal matter were evacuated by an incision in the bowel; this incision was clamped and subsequently sutured. After enlarging the incision in the abdominal wall a growth was detected in the cæcum; the ileum at about 12 inches above its termination was anastomosed by simple suturing with the ascending colon about 12 inches beyond the growth. The patient left the hospital on June 6, and was re-admitted on June 21. On June 23 the abdomen was again opened in the right iliac region, and the parts preserved in the specimen were removed, the ends of the ileum and ascending colon being closed by simple suturing. Convalescence was delayed by suppuration in the upper part of the wound and the formation of a small fæcal fistula, which had, however, closed when the patient was discharged on July 29. The patient was quite well in January 1902. (Mr. Barker's *Case-books,* 1899, vol. i, p. 348.)

1726. An ascending colon in longitudinal section, removed by operation for carcinoma. For an extent of 6 cm. the bowel is infiltrated in its whole circumference by a solid growth, which involves the whole thickness of the wall, and causes great narrowing of the lumen and shrinking of the bowel in length; the growth terminates abruptly above and below in an overhanging margin. The bowel is sharply curved in the position of the growth, and the thickness of the latter is considerably greater on the concave aspect. A piece of healthy omentum is adherent to the bowel. 8862

From a woman, aged 40. The part of the bowel preserved in the specimen, consisting of the whole of the shrunken ascending colon, was excised by Mr. Pollard in August 1901, end-to-end anastomosis being established by simple suturing. The patient appeared to be quite well in January 1902.

1727. Part of a colon, including the splenic flexure, in longitudinal section, removed by operation for carcinoma. The growth infiltrates the wall of the bowel circularly for an extent of 5·5 cm., and causes almost complete obliteration of the lumen. The muscular coat of the bowel is hypertrophied above and below the growth, but in the position of the latter it is destroyed. At one extremity the growth terminates in a polypoid excrescence. The bowel in the position of the tumour is surrounded by a large amount of indurated fat, the line of demarcation between which and the tumour itself is ill-defined. A depression on the posterior surface of the specimen corresponds with the position of the kidney, and in front of this is the divided tail of the pancreas. 8315

From a woman, aged 55, who was admitted into U. C. H., under the care of Mr. Pollard, on Sept. 12, 1899. She had been ailing for five months, and had experienced pain in the left loin for two months; there had been two attacks of colic attended with diarrhœa. On admission a tumour, thought to be renal, could be felt in the left loin; the urine was normal. On Sept. 14 the left kidney was exposed by an oblique incision in the loin; the peritoneum was opened and the tumour found to be situated in the splenic flexure of the colon, and to be adherent to the left kidney and infiltrating the tail of the pancreas. The splenic flexure of the colon, together with the left kidney and the tail of the pancreas, was removed, the ends of the bowel being united with a Murphy's button. On Sept. 19 an artificial anus was made in the cæcum in order to relieve the abdominal distension which followed the operation. On Oct. 4 the Murphy's button was removed from the rectum. The escape of fæces from the artificial anus in the cæcum became gradually less and the natural action of the bowels more abundant. On Nov. 10 the artificial anus in the cæcum was closed by operation. The patient left the hospital on Dec. 1, 1899. In Dec. 1901 the patient appeared to be in good health and there was no evidence of recurrent disease.

1728. The descending part of a colon, 20 cm. in length, removed by operation for carcinoma. The bowel has been laid open in the position of the growth, which involves nearly the whole of its circumference for a distance of 4 cm. The inner surface of the growth is ulcerated, and presents a well-defined raised border, which in one part has grown out into a considerable polypoid projection. In the rest of its extent the intestine is normal, but connected with its outer aspect, in the position of the tumour, by firm fibrous adhesions, is a thickened portion of the parietal peritoneum, with the corresponding part of the subperitoneal fat. 8848

Mrs. G., aged 57, had suffered from constipation for two years; a tumour in the position of the descending colon had been noticed for three months; the stools contained blood and mucus. On Nov. 11, 1901, Mr. Barker removed the part of the bowel preserved in the specimen, end-to-end anastomosis being established by simple suturing. The patient was quite well in Jan. 1902.

1729. Part of a descending colon, 17·5 cm. in length, removed by operation for carcinoma. The growth is annular, and causes a marked constriction on the outer aspect of the bowel. The lumen is narrowed so as only to admit the tip of the little finger. The bowel above the growth is hypertrophied and dilated. There are several diseased glands in the mesocolon. 8909

From a feeble woman, aged 72, in whom there had been symptoms for three months. The portion of bowel preserved in the specimen was removed by Mr. Barker, and end-to-end anastomosis established by simple suture.

1730. Part of a colon, 19 cm. in length, including the splenic flexure, removed by operation for carcinoma and laid open. The growth forms a prominent cauliflower-like mass involving the whole circumference of the bowel; the longitudinal extent of the latter actually involved by the growth is scarcely more than 2 cm., but the projecting part of the latter expands so as to measure 5·5 cm. On the outer aspect of the bowel is a deep transverse groove, corresponding in position with the growth within; adherent in the same situation is a considerable part of the great omentum. 8699

From a man, aged about 27. The portion of colon was excised by Mr. Pollard in April 1901, and end-to-end anastomosis established by simple suture. The patient seemed quite well in January 1902.

1731. Part of a transverse colon, 9·5 cm. in length, removed by operation for carcinoma, and laid open. The growth forms an annular ulcer which narrows the bowel for a distance of 3 cm. There is a large accumulation of fat between the layers of the mesocolon and in the appendices epiploicæ. 8588

From a woman, aged 76, who was the subject of diabetes, the urine containing 6·6 per cent. of sugar. There had been abdominal pain for eight months, and a tumour could be felt above and to the left of the umbilicus. Enterectomy was performed on Oct. 25, 1900. The patient was quite well in Feb. 1902. (Barker, 'Lancet,' 1901, vol. i, p. 623.)

1732. Part of a sigmoid colon, removed by operation for carcinoma, and divided longitudinally. The part removed measures about 9 cm. in length and at the centre the wall of the bowel is infiltrated in its whole circumference by a solid growth which narrows the lumen to a diameter of 7 mm. Externally the intestine is deeply puckered in the position of the stricture and the surrounding fat is very firmly adherent to it. 7425

From a man, aged 59, who was admitted into U. C. H., under the care of Mr. Raymond Johnson, in 1895, with a history of constipation, abdominal pain, and loss of flesh for four months. The tumour could be felt in the left iliac region. The abdomen was opened and the diseased portion of the sigmoid colon excised, the ends of the bowel being united with a Murphy's button. Death resulted from general peritonitis, due to leakage from the bowel at the seat of operation. (Surg. Reg. Rep. 1895, p. 76, No. 2094.)

INFLAMMATION OF THE VERMIFORM APPENDIX—APPENDICITIS.

Perityphlitis, or a localised peritonitis in the region of the cæcum, is, in the large majority of cases, due to an infection from the vermiform appendix, and very rarely to affections of the cæcum itself. Among the many conditions which render the appendix particularly prone to inflammation are: (1) that it is a blind recess in which fæcal concretions are liable to form, and, much less frequently, foreign bodies to lodge (1734, 1739); (2) that the large amount of lymphoid tissue present in its wall renders it very liable to catarrhal inflammation and erosion (1753); (3) that the small opening by which it communicates with the cæcum may readily become blocked and retention of secretions follow (1748); (4) that should the tube become kinked, retention of secretions and sometimes interference with the blood-supply may be caused; and (5) that in rare cases the appendix may be involved in the ulceration of typhoid fever, tuberculosis, or dysentery, and may be the seat of actinomycosis. Not uncommonly the inflammation of the wall of the appendix results in a gangrenous perforation (1736), but without the occurrence of actual perforation bacterial infection, especially by the bacillus coli communis, may occur in the adjacent peritoneum, and a local peritonitis, often subsiding without evidence of suppuration, may ensue. In some very severe forms of appendicitis perforation is not preceded by the formation of adhesions and general peritonitis results. Much more frequently a localised peritoneal abscess forms, the most common position of which is determined by the most common position of the appendix, and thus the abscess-cavity is on the inner aspect of the cæcum and bounded often in other parts by small intestine, omentum, and abdominal wall. Among other varieties of the abscess may be mentioned the intrapelvic form (1743) and that which extends upwards along the line of the colon and reaches the under surface of the diaphragm. A perityphlitic abscess may rupture through the abdominal wall or into the general peritoneal cavity, or into one of the hollow viscera, such as the bowel (1742), the bladder, or vagina.

The condition of the appendix most commonly associated with recurrent attacks of appendicitis subsiding without suppuration is that in which the lumen is narrowed or completely obstructed, as by kinking, so that the proper escape of the secretion is prevented, and in some instances considerable distension may result (1748).

1733. The cæcum and vermiform appendix of a child. The latter is 9·5 cm. in length, and at a distance of 2·5 cm. from its distal extremity the lumen is blocked by a soft brown concretion, which has been exposed by reflection of part of the wall of the appendix. Beyond the concretion the appendix is dilated and thickened, and presents an oval perforation nearly 2 cm. in length. 7370

From a boy, aged 10 years, in whom general suppurative peritonitis followed the disease of the appendix. Operation was performed on the fourth day; death occurred seven days later.

1734. An oval concretion, 18 mm. in length and 25 mm. in circumference, from a vermiform appendix. It is nearly white and soft enough to allow a needle to penetrate it. 7729

1735. The sloughed extremity of a vermiform appendix, together with a concretion 15 mm. in length. 7899

From a girl, aged 10, who had been ill for ten days with very mild symptoms of appendicitis. The concretion was loose in a small abscess-cavity behind the cæcum, which contained about 2 ounces of stinking pus.

1736. A cæcum, together with the end of the ileum and the appendix. Near its free end the appendix presents a large oval perforation; beyond this the appendix is swollen and distended by a concretion. 5063

From a boy, aged 17, who was admitted into U. C. H., under the care of Sir William Jenner, July 6, 1865. He had been ill since July 1, when he was attacked with sudden abdominal pain, most severe in the right iliac region. On admission the temperature was 103°; there was general fulness of the abdomen, most marked and accompanied with extreme tenderness in the right iliac region. Death occurred suddenly on July 10; there was general peritonitis and a localised intraperitoneal abscess in the cæcal region; in the abscess was a concretion as large as a pea. (Sir W. Jenner's *Case-books*, Males, 1865, vol. vi, p. 314.)

1737. Part of a vermiform appendix, in which is a perforation near the free end, together with a large, oval, soft concretion. 8007

From a man, aged 35, under the care of Mr. Godlee. There was a large localised abscess, in which was the concretion; part of the appendix was removed; the patient did well.

1738. A vermiform appendix, 15 cm. in length, removed by operation, together with a large fæcal concretion which it contained. In the proximal half the appendix is considerably swollen and presents two perforations. At nearly all parts the serous coat is covered with a layer of torn fibrous adhesions, but near the distal end there is a more recent inflammatory exudation on the surface. 8320

1739. A healthy vermiform appendix removed by operation and laid open to expose part of a needle, the point of which perforates the wall. 7264

The appendix was removed by Dr. Herbert Spencer during the performance of ovariotomy.

1740. A cæcum, laid open, together with the termination of the ileum and the appendix. The latter lies behind the inner part of the cæcum, and near its free extremity presents a large irregular perforation. The opening of the appendix into the cæcum is patent, and between this point and the perforation the mucous membrane of the tube is slightly swollen but not ulcerated. The position of an abscess, which resulted from the disease of the appendix, is indicated by an extensive layer of inflammatory exudation on the posterior aspect of the cæcum and the adjacent part of the ileum. 6218

1741. Five concretions from the appendix preserved in the last specimen, all of which, except one, have been divided. In one the laminated structure is well shown. 6218

From a boy, aged 13, in whom operation was performed on the ninth day of an attack of appendicitis. Fœtid pus was evacuated by an incision in the cæcal region. Death occurred 36 hours after the operation from general peritonitis. (Surg. Reg. Rep. 1886, p. 51, No. 1009.)

1742. A cæcum, with the adjoining parts of the ileum and ascending colon. The appendix lies internal to the cæcum and behind the termination of the ileum; near its extremity the wall of the appendix has sloughed in nearly its whole circumference for a distance of 2 cm., so that the free extremity is almost detached. Around the perforation the position of an abscess is indicated by a thick layer of inflammatory exudation on the peritoneum; the area involved by the abscess involves part of the posterior surface of the cæcum, in which is a round perforation 5 mm. in diameter. There is a mass of swollen glands in the mesentery of the lower part of the ileum. 6703

There is no history to the specimen, but it is probable that the abscess resulting from the perforation of the appendix opened into the cæcum.

1743. A sagittal section through the pelvic viscera of a female, showing an abscess in Douglas's pouch, which resulted from appendicitis and was opened from the vagina. The abscess-cavity is bounded behind by the rectum, below and in front by the uterus and vagina, and above by coils of small intestine, which are adherent one to another and to the uterus. The opening by which the abscess-cavity communicates with the roof of the vagina to the right of the middle line is marked by a piece of glass rod. 8208

1744. A fæcal concretion from the abscess preserved in the preceding specimen. It is cylindrical, curved, and 18 mm. in length. 8208

The pelvic abscess was opened *per vaginam* and drained. Death occurred from pyæmia.

1745. A vermiform appendix, removed by operation. At the middle of its length, for a distance of 15 mm., its continuity has been almost entirely destroyed by sloughing. 7382

1746. A vermiform appendix, 10 cm. in length, removed by operation and laid open. Near its proximal extremity are three minute perforations, through which bristles have been passed. The mucous membrane is throughout thickened and, at about the middle of the length of the appendix, appears to have cicatrised after superficial ulceration. 7305

From a woman. The appendix was removed by Mr. Barker, during a first attack of appendicitis attended with severe collapse. The appendix was surrounded by adhesions, but suppuration had not occurred.

1747. A vermiform appendix, removed by operation. At a distance of 15 mm. from the distal end, and opposite the mesenteric attachment, is a small perforation surrounded by a prominent lip, probably of everted mucous membrane. 8406

From a man, aged 45, who was under the care of Mr. Godlee in Jan. 1900. Previous attacks of appendicitis had occurred in 1898 and 1899. At the operation the end of the appendix was found to be adherent to the right kidney.

1748. A vermiform appendix, removed by operation. The lumen is obliterated at the proximal end and in the rest of its extent dilated. It was filled with pus. 7518

From a man, aged 42, who suffered from recurrent attacks of appendicitis.

1749. A vermiform appendix, removed by operation. It is sharply curved upon itself, the parts of the curve being adherent one to another. The wall of the appendix is swollen and the lumen is distended, except at the proximal end, where it is obliterated. 7790

The appendix was removed from a man, aged 22, after four attacks of appendicitis; the last attack was the most severe and attended with signs of widely spread peritonitis. (Surg. Reg. Rep. 1897, p. 42, No. 637.)

1750. A vermiform appendix, together with a small piece of adherent omentum, removed by operation. The appendix is curved almost into a complete circle. At a short distance from the proximal end the lumen is obliterated; beyond this point the walls are thickened, the lumen distended, and at the distal end the mucous membrane is eroded. 7770

From a case of recurrent appendicitis.

1751. A small part of a cæcum, together with the appendix. In the proximal 2 cm. of its length the appendix is normal in size and its lumen is patent; beyond this the appendix is distended into a cyst, the interior of which has no communication with the proximal part of the tube. The cyst is irregularly ovoidal, and measures 7·5 cm. in length; in most parts the wall is thin, but at its distal end the extremity of the appendix is indicated by a nipple-shaped projection with a much thicker wall, and marked off internally from the rest of the cyst by a sharp circular border. 6991

From a man, aged 44, who died on May 11, 1893, from bronchitis and cardiac dilatation. (Dr. Poore's *Case-books*, Males, 1893, vol. ii, p. 524.) In 1878 the patient had been in U. C. H., under the care of Dr. Wilson Fox, for 3 months, suffering from supposed intestinal obstruction, the symptoms being obstinate constipation, vomiting, and slight elevation of temperature. A year later a similar attack, lasting 3 or 4 weeks, occurred. (Dr. Wilson Fox's *Case-books*, Males, 1878, vol. i, p. 149.)

1752. A vermiform appendix removed by operation. In its proximal half it is swollen and coated with inflammatory exudation, which extends on to the surrounding fat. 8371

From a man, aged 30, in whom the first attack of appendicitis occurred 5 years, and the second 3 weeks, before the operation. There was a small abscess containing offensive pus and a stercolith.

1753. Three vermiform appendixes removed by operation and laid open to display swelling and erosion of the mucous membrane. 7971, 7970, 8451.

From cases of recurrent appendicitis.

1754. A vermiform appendix removed by operation and laid open to display a small concretion and irregular swelling of the mucous membrane. 8545

From a man, aged 27, in whom three attacks of appendicitis had occurred, 2 years, 6 months, and 21 days respectively, before the operation.

1755. A vermiform appendix, removed by operation. It is 12·5 cm. in length and is bent into a sigmoid loop, the limbs of which are loosely held together by adhesions. In other respects the appendix is normal. 8891

From a boy, aged 16, under the care of Mr. Godlee. Only one definite attack of appendicitis had occurred, but there had been frequent previous attacks of "stomach-ache." The coiled appendix was adherent to the posterior surface of the outer part of the cæcum.

1756. A vermiform appendix, removed by operation and laid open. The wall is thickened, the mucous and submucous coats together measuring 4 mm. 8424

From a man, aged 50, who for 2 months had suffered from symptoms of intestinal derangement; the motions were loose and very offensive, but contained no blood or mucus. The patient had become pale and cachectic, and the temperature varied irregularly between subnormal and 100°–100°·8. The appendix was removed, and the patient was gradually completely restored to health. (Sidney Martin, Med. Chir. Trans. 1901, & B. M. J. 1901, vol. i, p. 1203.)

1757. A cæcum with its appendix, together with part of the right lobe of the liver. The appendix is attached to the under surface of the liver by a broad membranous adhesion, formed in connection with the omentum. 8855

INFLAMMATION OF DIVERTICULUM ILEI.

1758. A portion of the lower part of an ileum, together with a Meckel's diverticulum. The latter has completely separated from the wall of the intestine; it forms an elongated, slightly pyriform pouch, 6 cm. in length and about 13 mm. in diameter; the wall of the pouch is thin, soft, greyish in colour, and coated on its surface with a thin layer of inflammatory exudation. The aperture in the wall of the intestine resulting from the separation of the diverticulum is circular and has a diameter of 8 mm.; it is situated on a slight bulging of the wall of the intestine, on the opposite aspect of which is a shallow groove. 8933

From a boy, aged 8, who was admitted into U. C. H., Feb. 10, 1902, for obstruction of the bowels, abdominal pain, and vomiting. The symptoms began on Feb. 7, before which the child appeared to be in good health. Peptonized milk was given by the mouth and enemata administered. For three days the vomiting ceased and then began again. On Feb. 15 the child suddenly became collapsed, and presented all the signs of perforative peritonitis. The abdomen was opened above the pubes and purulent peritonitis with adhesions found. Death occurred on Feb. 17. There was general peritonitis, with collections of pus enclosed by adhesions; the sloughed diverticulum was completely detached; the opening in the ileum was 30 cm. above its termination. (Mr. Barker's *Case-books*, 1902.)

DISEASES OF THE RECTUM AND ANUS.

MALFORMATIONS OF THE RECTUM AND ANUS.

(*See* CONGENITAL MALFORMATIONS.)

HÆMORRHOIDS.

Hæmorrhoids result from a varicose condition of the veins of the anus and the lower part of the rectum, the veins affected being those which, commencing in small dilatations at the lower end of the anal canal, run upwards in the submucous tissue of the columns of Morgagni to the hæmorrhoidal plexus (1759). Piles are external or internal, according as they are covered by skin or mucous membrane. Hæmorrhage occurs only as a symptom of the internal variety. An external pile is composed of a fold of hypertrophied skin at the margin of the anus, containing a small varicose vein and often a small artery. In internal piles there may be a general varicose condition of the veins or definite tumours may be present. In the former condition the ring of thickened mucous membrane may become protruded from the anus during the act of defæcation, producing the condition known as prolapsus ani (1760). Circumscribed internal piles may form longitudinal column-like swellings or globular tumours. Internal piles protruded through the anus and strangulated by the contraction of the sphincter become swollen and, unless reduced, finally slough.

1759. A rectum and anus injected through the inferior mesenteric artery. Within the anal canal are numerous longitudinal swellings resulting from enlargement of the natural columns of the rectum. By the removal of the mucous membrane from one of the columns it is shown that the swelling is formed by a mass of small dilated veins. 8564

The specimen illustrates the structure of internal piles.

1760. The lower part of a rectum, with the skin around the anus. The aperture of the anus is stretched and fully occupied by a swelling formed by a protrusion of the mucous membrane of the lower part of the rectum and some large internal piles. The prolapsed mass forms an irregular hemispherical swelling, depressed in its centre and divided into several lobe-like portions of various size, some of these portions being swollen folds of the mucous membrane, and others internal piles. A piece of bougie has been passed along the canal, which is considerably narrowed by the swelling of the prolapsed parts. The surface of the protrusion is excoriated, and in places superficially ulcerated, or covered with exudation. 3788

1761. A complete ring of anal mucous membrane and adjacent skin. In the mucous membrane are several swellings caused by internal piles. 7804

Removed by operation.

PROLAPSE OF THE RECTUM.

This occurs in two forms, the incomplete and complete. In the former the prolapse involves only the mucous membrane; the condition is then commonly called prolapsus ani, and results from a hæmorrhoidal condition of the mucous membrane. In complete prolapse all the coats of the rectum are involved; the condition occurs chiefly in children, and usually results from causes attended with frequent straining efforts.

ABSCESS OF THE RECTUM AND ANUS. FISTULA IN ANO.

Abscesses very frequently form in connection with the lower part of the rectum and the anus. The most common situations are beneath the mucous membrane (submucous abscess) and beneath the skin at the margin of the anus (marginal abscess). A submucous abscess may be due to injury of the mucous membrane, or may begin as suppuration around a dilated and inflamed hæmorrhoidal vein; in other cases it is tuberculous. A submucous abscess after bursting into the bowel or through the skin near the anus almost always becomes a fistula, which according as it opens in one or both of these situations is often spoken of as "blind" or "complete"; the track of the fistula is altogether superficial to the external sphincter.

Abscess in the ischio-rectal fossa arises from causes not always clearly to be ascertained; occasionally it results from complete perforation of the gut by some foreign body, as a fish-bone which has been swallowed (1763). An ischio-rectal abscess usually opens into the bowel between the internal and external sphincters, as well as through the skin, and thus the track of the resulting fistula lies on the deep aspect of the external sphincter. Abscesses and fistulæ are frequently met with as complications of diseases of the rectum accompanied by ulceration, such as syphilitic disease and new growths, and are not uncommon in connection with simple stricture.

As a complication of diseases of the rectum itself or as an extension of other abscesses in the pelvis, suppuration sometimes occurs around the bowel above the levator ani in the connective tissue of the pelvi-rectal space.

Fistulæ following abscess-formation about the lower part of the rectum, instead of opening on the cutaneous surface, may open into the bladder or urethra in the male and the vagina in the female.

1762. The lower end of a rectum with the anus. On one aspect of the anal canal, and passing around half its circumference, is the sac of an abscess. The abscess is situated close beneath the skin, and is prolonged upwards about as far as the constriction formed by the internal sphincter; it is apparently superficial to the fibres of the external sphincter, and opens into the rectum by a wide aperture, through which a bristle has been passed; the rectum at this part is deeply excavated by ulceration. On the right side of the specimen, the mucous membrane of the rectum, which forms the inner wall of the abscess, has been divided from the margin of the anus as far as the upper end of the cavity. 700

1763. A fish-bone, removed from the cavity of an abscess which formed in connection with the rectum. The abscess opened on the surface outside the external sphincter, and within the gut immediately above the internal sphincter. The bone, which is very sharp at one end, measures about 3 cm. in length.

Ulceration of the Rectum and Anus. Fibrous Stricture of the Rectum.

1. *Simple Ulcer.*—Simple ulceration of the rectum is probably due most commonly to injury, such as an excoriation of the mucous membrane during defæcation, and is more liable to occur if the mucous membrane is in a state of venous congestion resulting from piles. Ulceration of the rectum is supposed also to arise from injury during parturition. A simple ulcer is usually single and situated at the posterior part of the gut; but two or more may be present. The ulcer is usually nearly circular (1764); the edges are irregular and very slightly raised, and the base is somewhat indurated. Irritable ulcer of the anus, or fissure of the anus, is a narrow ulcer extending over the external sphincter as far as the margin of the skin, where its extremity is often overlapped by a small external pile. It is a cause of intense pain.

   Multiple superficial ulcers are occasionally met with, arising in the solitary follicles, and known as "follicular ulcers."
2. *Dysenteric Ulceration.*—Especially in chronic dysentery the rectum may be affected in common with other parts of the large intestine.
3. *Tuberculous Ulceration.*—This may occur in a very extensive form of irregular ulceration, or may be limited to a small ulcer around the internal opening of a tuberculous fistula. It is usually associated with pulmonary tuberculosis.
4. *Syphilitic Ulceration.*—This is of frequent occurrence, especially in women, and probably commences as a gummatous infiltration of the mucous membrane. The ulceration is often very extensive and irregular, and may reach from the anus to the sigmoid colon (1767). The edges of the ulcer are raised and hard, and the floor grey and sloughy. The ulcer is often spreading at one part and healing at another. The whole of the coats of the gut are thickened and indurated, and irregularly distorted by the contraction of the healing ulcer, and the calibre is often greatly diminished, sometimes almost to complete occlusion (1767). The peritoneal coat is usually opaque and thickened, and often adherent to surrounding parts. The depth of the ulceration varies; in most parts it is confined to the mucous coat, but it may extend to the other coats and lead to perforation. If perforation occurs, abscesses form outside the bowel and may burst in various directions, causing fistulæ opening on the skin around the anus (1765), into the vagina (1766), or communicating with adherent coils of intestine.
5. *Ulceration from Malignant Disease.*—*See* Carcinoma.

Simple fibrous stricture may result from the healing of any form of ulcer of the rectum. It is a frequent result of syphilitic ulceration. The degree of stricture occasioned by the healing of even a small ulcer is sometimes so extreme as to suggest that persistent muscular contraction has played an important part in its production.

1764. The lower part of a rectum and the anus. In the anal canal, 15 mm. above the orifice, is a nearly circular ulcer, about 5 mm. in diameter; it involves the whole thickness of the mucous membrane and has sharply-cut edges. There are two or three small external hæmorrhoids around the anus. 699

1765. Part of a rectum with the vagina and uterus, the rectum and vagina having been laid open. In about its lower 5 cm. the rectum is riddled with ulcerated tracks, which pass from it in all directions, and open externally and into the vagina. The different sinuses are marked by bristles: one leads directly backwards, and opens behind the anus; others pass outwards into the surrounding structures, whilst some open downwards in the perineum. In the posterior wall of the vagina, close above the labia, is an irregular ulcerated aperture, about 15 mm. in its longest measurement, leading to a space into which two or three sinuses from the rectum open. All the tissues around the lower end of the rectum are indurated and adhere firmly to its walls, which are so thickened and puckered by the healing of ulcers as considerably to constrict the gut in its lower 5 cm. The mucous membrane of the rectum is for the most part superficially ulcerated; close above the inner openings of the fistulæ it is more deeply pitted; a bristle has been passed beneath a fold of mucous membrane the base of which is perforated by ulceration. The anus is surrounded by external hæmorrhoids. 702

There is no history to the specimen, but from the extensive superficial ulceration, and the situation of the stricture close to the anus, the disease is probably syphilitic.

1766. A rectum with the uterus and vagina, the rectum being laid open from the right side, the vagina and uterus from the front. The rectum, for about its lower 7 cm., is thickened and indurated, as a result of long-continued inflammation and ulceration of its walls, and the canal, for a distance of about 4 cm., is tightly constricted. Numerous fistulæ lead from the rectum, some passing backwards and others forwards through the posterior wall of the vagina; two bristles are placed in tracks, by which a communication is formed between the rectum and vagina. In the upper part of the posterior wall of the vagina, immediately behind the cervix uteri, is a circular opening about 3 mm. in diameter, the aperture of a third fistula between the rectum and vagina; close to the left of this is a small pit, at the bottom of which a minute opening appears to exist. The edges of the several apertures are sharply defined and smoothly rounded, as if healed. The skin around the anus is thrown into hæmorrhoidal folds. 701

From a woman about 40 years of age, in whom a fistulous communication between the rectum and vagina had existed for about a year before she died. The disease is doubtless syphilitic.

1767. A rectum laid open posteriorly, together with the thickened and adherent surrounding tissues. In the lower 15 cm. of its length the rectum is entirely devoid of mucous membrane, the inner surface being formed by the condensed submucous tissue, which is marked, in the upper part, by transverse fasciculi of the hypertrophied muscular coat. In the lowest 9 cm. the rectum is greatly narrowed, the constriction being most marked at points 3 cm. and 8 cm. above the anus. Several small sinuses lead from the diseased part of the rectum into irregular abscess-cavities in the surrounding tissues. The lowest limit of the mucous membrane can readily be recognised at a distance of 15 cm. above the anus as a sharp, sinuous, slightly undermined edge. Above this border two separate ulcers are seen in the mucous membrane; the larger of these, which has been divided in laying open the bowel, measures more than 2 cm. in diameter and presents a smooth floor and a raised, deeply notched, and slightly undermined border. On the right side of the anus are two prominent hæmorrhoids. 1065

The disease is probably syphilitic.

1768. A rectum, with part of the skin behind the anus. In its lower 12 cm. the wall of the rectum is considerably increased in thickness, partly by hypertrophy of its muscular coat, partly by thickening and induration of the tissues around. The greater part of the mucous membrane has been destroyed by ulceration, an isolated patch with a wavy outline and sharply defined margins remaining about 9 cm. above the anus. Above this level the muscular coat is extensively denuded, the ulceration having destroyed the mucous membrane as high as 12 cm. above the isolated area noticed; the edges of the mucous membrane are deeply scalloped, in places sharp and clearly defined, in others shelving. Beyond the upper limit of this large ulcerated area are two small circular ulcers of the mucous membrane, and to the right of these part of another much larger ulcer. The whole of the large ulcerated surface first mentioned is longitudinally and transversely ridged, but firm and indurated. From the lower end of the rectum narrow fistulous passages pass through the skin behind the anus. Beneath the integument is a flattened abscess-cavity, from which the apertures in the integument lead.

The disease is probably syphilitic.

1769. A [illegible]

1769. A rectum in longitudinal section, showing extensive destruction of the mucous membrane by ulceration. Around the anus is a ring of small internal and external piles. Above this for a distance of 3 cm. the mucous membrane remains and presents one small oval ulcer. Above this level for a distance of 13 cm. the mucous membrane has been entirely destroyed, except along a narrow strip in the lower part. At the upper limit of the denuded area the lower limit of the mucous membrane is marked by a sinuous, raised, and for the most part sharply-cut edge. Above this border the mucous membrane is normal, except for the presence, in its lower part, of one small oval ulcer. In the whole extent of the ulceration the rectum is intimately adherent to the indurated and thickened surrounding tissues, and the lumen is uniformly narrowed. 5879

From a married woman, aged 42, who had suffered from symptoms of stricture of the rectum for 15 years. There was no definite history of syphilis. Death occurred from pneumonia. The pelvic viscera were extensively adherent. (Mr. Marshall's *Case-books*, 1882, vol. i, p. 177.)

SIMPLE TUMOURS OF THE RECTUM.

1. *Adenoma.*—This is met with most commonly in children as a small polypus attached to the mucous membrane by a slender pedicle. It is covered with columnar epithelium, and contains spaces lined with columnar cells (1770).
2. *Papilloma.*—This forms the "villous tumour" of the rectum, which is composed of long branching papillæ, often several centimetres in length, seated on a flat slightly raised base. The papillæ are composed of delicate vascular tissue, covered with columnar epithelium. These tumours may reach a considerable size. They occur in adults, and are seated usually within easy reach of the finger, and are confined to one side of the gut (1771).
3. *Angioma.*—No. 1775 is an example of this very rare disease, which proved fatal from hæmorrhage.
4. *Fibroma.*—Small fibrous polypi are not uncommon in the rectum, especially at the upper end of a fissure. They probably originate by fibrous transformation of internal piles.

1770. A small adenoma of the rectum, in section. The surface is smooth, except at the point of attachment of the pedicle. Several small cysts have been divided by the section. 5822

Microscopic Structure.—The tumour consists of spaces lined with columnar epithelium and lying in a delicate fibrous stroma.

There is no history to the specimen.

1771. A large villous tumour, somewhat like the flowering head of a chrysanthemum, which grew from the mucous membrane of the rectum. The growth is of a compressed globular form, and has a diameter of 7 cm.; it presents a slight indication in the furrows in its margin of being composed of numerous small closely applied lobes; the main part of the growth consists of long leaf-like curling processes arranged upon a convex solid base. At the back of the preparation is a small flat surface, deeply buried among the long processes surrounding it—the severed pedicle by which it was attached to the mucous membrane. Above the main tumour is suspended a much smaller mass, which is probably a portion detached from the tumour first described.

The parts shown were removed by Mr. Quain from the rectum of a woman, aged 67. When removed the tumour was upwards of four inches in length, of a bright red colour, and covered with blood and mucus. It was fixed to the rectum, about three inches above the anus, by a fibrous pedicle two inches broad.

1772. A growth similar to, but much smaller than, the preceding. It presents appearances of lobulation, and is composed mainly of long, tufted, closely packed projections arranged upon a convex base. It appears to have been attached by a very slender neck to the mucous membrane, the only indication of a pedicle being on the back of the specimen, where there is a small divided surface, a little to the left of its middle. The tumour is of a brownish colour and was very vascular. 4378

It was removed by Mr. Quain from the rectum of a middle-aged woman who had lost blood per anum, at intervals, for 20 years. The tumour was protruded at each act of defæcation; it was connected with the posterior wall of the rectum above the sphincter. It was probably sessile; but when protruded a narrow fold of mucous membrane descended with it, after the manner of a pedicle. The patient made a good recovery.

1773. A small villous tumour of the rectum; the narrow pedicle by which it was attached to the mucous membrane of the rectum is not recognisable. 4241

From a woman, aged 55, under the care of Mr. Quain. She was in good health, and recovered rapidly after the operation.

1774. A lobulated villous tumour of the rectum, 8 cm. in its greatest measurement. The tumour is of a dark red colour, and the irregular lobules of which it is composed present a delicate tufted surface. On the posterior aspect of the specimen is seen part of the mucous membrane of the rectum to which the tumour has a narrow attachment 4·5 cm. in length. 7831

Microscopic Structure.—The solid part of the tumour consists of a delicate fibrous stroma containing rounded and irregular spaces lined with a single layer of columnar cells.

From a woman, aged 59, who was admitted into U. C. H., under the care of Mr. Heath, on July 5, 1897. She began to suffer with "piles" eight years previously; a lump sometimes became prolapsed from the anus, and later there was a slimy discharge, with attacks of diarrhœa. The tumour was attached to the posterior wall of the rectum, and could be drawn completely outside the anus; it was removed after transfixing and ligaturing the pedicle. The patient rapidly recovered, and was discharged on August 6. (Mr. Heath's *Case-books*, 1897, vol. i, p. 377.)

1775. The anterior half of a rectum, the section, on the left side, having passed through an extensive cavernous nævus of the mucous membrane. The extent of the growth is best seen on the cut surface, and reaches from a point about 2 cm. above the anus upwards for 8·5 cm., and extends inwards to about the middle of the anterior wall. The growth is limited in depth by the muscular coat, and has a maximum thickness of about 14 mm. The mucous membrane covering it is raised in two irregular longitudinal columns separated by a deep sulcus. The section of the growth has passed through an irregular ulcer on its inner surface, on the floor of which are two velvety patches. Below this ulcer is a much smaller and almost linear one. On the divided surface of the growth a cavernous structure can, in parts, be recognised. In the neighbourhood of the growth the mucous membrane of the rectum is irregularly folded, and in the upper part of the specimen are numerous small follicular ulcers. 5795

Microscopic Structure.—The tumour is a cavernous angioma.

From a man, aged 45, who was admitted into U. C. H. on April 19, 1882. Since boyhood he had occasionally suffered from slight rectal hæmorrhage during attacks of constipation. Eight months before admission an attack of diarrhœa, lasting four or five days, occurred, with considerable loss of blood at each stool; this was followed by constipation, with occasional hæmorrhage and frequent desire to go to stool. Rectal examination revealed the presence of three shallow ulcers, from which blood continuously oozed; around the ulcers the folds of mucous membrane presented a peculiar mottling of a purplish colour. The hæmorrhage could not be arrested. The patient became intensely anæmic, and death occurred on May 5. (Barker, Med. Chir. Trans. 1883, vol. lxvi, p. 229, and Mr. Marshall's *Case-books*, 1883, vol. i, p. 57.)

MALIGNANT TUMOURS OF THE RECTUM AND ANUS.

Carcinoma of the rectum is very common, and, although differing much in its naked-eye characters, is always of the columnar-cell variety; carcinoma of the anus is much less common and is of the squamous-cell variety. Carcinoma may originate in any part of the rectum, but is especially common immediately above the anus (1776), at about a finger's length above this (1779), and at the junction of the rectum and sigmoid colon (1781). The tumour may be met with as a circumscribed nodular growth limited to one aspect of the bowel and ulcerated on the surface, or it may extend around the whole circumference of the gut. Sometimes the tumour presents a villous surface, and in rare instances a large mass of growth occupies the lumen of the bowel. The gradual extension of the growth into the outer coats of the bowel is followed by its fixation to surrounding structures, and if the growth is annular the contraction produces a stricture of the gut (1779). Such an annular growth, constricting the upper part of the rectum, may be gradually forced downwards so as to produce a varying degree of intussusception. By the continued extension and ulceration of the growth abscesses and fistulæ may form outside the bowel; perforation may occur into the peritoneal cavity (1777), or a communication may be established between the rectum and one of the neighbouring cavities, especially the bladder (1782) or urethra in the male, and the vagina in the female (1778). Secondary deposits in columnar carcinoma of the rectum are only common in the lymphatic glands and in the liver. The parts removed by operation for cancer of the rectum are shown in Nos. 1783 to 1788, and the operations of inguinal and lumbar colotomy are illustrated in Nos. 1790 and 1791.

Sarcoma of the rectum is very rare.

1776. The lower part of a rectum, together with the bladder, both having been laid open. The lower part of the rectum is the seat of an extensive ulcerated growth, which involves its whole circumference for a distance of 6 cm. The surface of the ulcer is irregularly excavated and nodular; the lower edge is formed by a raised and everted border of infiltrated mucous membrane; the upper edge of the ulcer is nearly transverse and much less raised. The extension of the growth has caused deep puckering of the floor of the recto-vesical pouch and induration beneath the trigone of the bladder. 5519

Microscopic Structure.—The tumour is a columnar carcinoma.

From a man, aged 60, who was admitted into U. C. H., under the care of Mr. Heath, Oct. 13, 1880. The symptoms of the disease were of fifteen months' duration, and at the time of admission consisted of aching pain in the sacral region, constipation, mucous discharge and slight bleeding from the rectum, and constant desire to micturate. Left lumbar colotomy was performed on Oct. 20. Death occurred on Oct. 23. (Mr. Heath's *Case-books*, 1880, vol. i, p. 312.)

1777. Part of a rectum, together with the uterus and vagina. In its lower part, for a distance of 4·5 cm., the whole circumference of the rectum is involved in an ulcerated growth, which extends downwards to within 2·5 cm. of the anus. The floor of the ulcer is irregular and trabeculated, and at the upper part the circular muscular fibres are cleanly exposed. The upper and lower borders of the ulcer are well defined and formed by slightly raised, infiltrated, mucous membrane, which, especially along the upper border, has, in parts, a finely papillary surface. Above the growth are several small ulcers in the mucous membrane. Immediately below the upper border of the disease a perforation marked by a piece of glass rod leads into the floor of Douglas's pouch, the peritoneum of which is coated with a thin layer of exudation. 4221

From a patient, aged 45, who died unexpectedly from peritonitis, following upon the extravasation of fæcal matter into the abdominal cavity through the small opening close to the reflexion of the peritoneum on the posterior wall of the vagina.

1778. A rectum, together with the uterus and vagina, the rectum being the seat of a carcinoma and a papilloma. The carcinoma forms a large irregularly rounded ulcerated growth, surrounding the bowel for a distance of 9·5 cm., the lower border being at the anus. The edges of the ulcerated growth are nodular, raised, and markedly everted; the floor of the ulcer is hard and irregularly excavated, one hollow, deeper than the rest, and situated near the upper border of the growth, corresponding with a smooth rounded projection of the tumour into the posterior wall of the vagina. Above the carcinoma, and separated from it by at least 2 cm. of healthy mucous membrane, is a large papillomatous growth of a typical cauliflower-like appearance, and having a transverse measurement of nearly 9 cm., and an almost linear attachment to the mucous membrane. Half the right kidney is preserved, and shows two small secondary deposits in its substance. 8089

From a woman, aged 68, who was admitted into U. C. H., under the care of Mr. Raymond Johnson, Aug. 29, 1898. The symptoms were of two years' duration, and consisted of gradual emaciation, pain in the left iliac region extending to the back and hips, discharge of jelly-like material from the rectum, and, lately, incontinence of fæces. Left inguinal colotomy was performed in two stages, on Aug. 30 and Sept. 6. The patient gradually sank and died on Sept. 13. There were secondary growths in both kidneys, but none were detected in the liver or elsewhere. (Mr. Godlee's *Case-books*, 1898, vol. i, p. 394.)

1779. A rectum, together with the bladder, laid open from the right side. For a distance of 7 cm. the wall of the bowel is involved in its whole circumference by an ulcerated carcinoma, the lowest limit of which is 6 cm. above the anus. In the lowest 3 cm. of its extent the growth has caused a tight annular stricture, which, viewed from below, presents an irregular ulcerated opening, large enough to admit the little finger, and surrounded by a hard everted border. The bladder is firmly adherent to the rectum as high as the upper limit of the disease, but does not appear to be actually involved. 1633

1780. A rectum, laid open to display a carcinomatous tumour in the upper part. The growth is annular, and involves the bowel for a distance of 5·5 cm., the lower border being 9 cm. above the anus. The inner surface of the growth is irregularly ulcerated, the lumen of the bowel being greatly narrowed, and the growth has extended through the muscular coat into the surrounding fat. 7494

From a woman, aged 50, in whom symptoms of stricture of the rectum had existed for about nine months. Left inguinal colotomy was performed, and death occurred seventeen days later. The liver weighed 7 lbs., and was infiltrated with secondary deposits. There was one diseased lymphatic gland on the left common iliac artery. (Surg. Reg. Rep. 1895, p. 74, No. 2762.)

1781. The adjacent parts of a sigmoid colon and rectum, an annular carcinomatous ulcer being situated at the junction of the two. The ulcer, which is surrounded by hard growth infiltrating the wall of the bowel and the surrounding fat, has a longitudinal extent of 3·5 cm. The lower margin of the ulcer presents several irregular polypoid outgrowths, one of which, much larger than the rest, is 3 cm. in length and attached to the edge of the ulcer by a constricted base. Above the upper border of the ulcer the folds of the mucous membrane are hypertrophied and present several small rounded projections. 6659

From a man, aged 57, in whom the symptoms began sixteen months before his admission into U. C. H., with diarrhœa and painful defæcation; these were followed by abdominal pain, constipation with passage of blood and slime, and gradual loss of weight. Left inguinal colotomy was performed in two stages. Death occurred, on the 24th day, from suppuration in the neighbourhood of the colotomy wound and peritonitis. The left ureter was obstructed by the growth, the pelvis and calyces of the left kidney being much distended; there were large numbers of secondary growths in the liver and on the under surface of the diaphragm, and a deposit of growth in a lymphatic gland in the anterior mediastinum. (Surg. Reg. Rep. 1891, p. 112, No. 475.)

1782. A sagittal section of a rectum and bladder, showing a carcinoma of the rectum which has extensively involved the bladder and the intervening tissues. The rectum is invaded by the disease for a distance of 10 cm., the lowest limit of the ulcerated growth in the mucous membrane being 14 cm. above the anus. In the position of the disease the lumen of the rectum is converted into an irregular ulcerated cavity, surrounded by hard solid growth which has invaded the surrounding parts on all aspects of the bowel.

Bulging into the anterior wall of the lower part of the rectum is a rounded mass of tumour-substance 5 cm. in diameter, which is situated between the rectum and the bladder and prostate; over the surface of this mass the mucous membrane of the rectum and, in most parts the muscular coat, are intact. The recto-vesical pouch is almost entirely obliterated, and from the anterior wall of the rectum the tumour extends continuously into the posterior wall of the bladder. Over an area 2·5 cm. in diameter the posterior wall of the bladder is completely destroyed, and the growth projects in this situation as a solid polypoid mass completely filling the cavity of the bladder, and presenting a very irregular shreddy surface.

A gland in the mesorectum is infiltrated by the disease. 7556

Microscopic Structure.—The general structure of the tumour is that of a columnar carcinoma. In that part of the tumour which projects into the bladder some of the alveoli contain, in addition to the columnar cells, nest-like concentrically-marked bodies which appear to be composed of squamous cells.

From a man, aged 45, who was admitted into U. C. H., under the care of Dr. Ringer, April 8, 1896. For 12 months he had suffered from wasting and diarrhœa, the motions at times containing blood and slime. For 5 weeks micturition had been frequent and painful, but no blood had been noticed in the urine. On admission the patient was wasted; about 18 liquid motions containing mucus were passed daily; there were resistance and tenderness in the left iliac fossa and a swelling like a moderately distended bladder to be felt above the pubes; an extensive growth could be felt in the rectum. The patient's weakness increased, vomiting began, and the abdomen became distended. Left inguinal colotomy was performed by Mr. Pollard on April 16; death occurred on April 18. (Dr. Ringer's *Case-books*, 1896, Males, p. 409.)

1783. A small piece of the wall of the rectum removed by operation for a carcinomatous ulcer. The growth, which is situated at the upper part of the specimen, is irregularly rounded in outline and measures 3 cm. in diameter. The edge of the ulcer is at all parts raised and at some parts nodular and overhanging. The fat on the outer surface of the rectum in the position of the disease appears to be healthy. 7637

From a woman, aged 50, under the care of Mr. Godlee in July 1896. She had suffered from piles for some years, the symptoms of the growth being of only 6 months' duration. The ulcer was situated on the anterior wall of the rectum. The patient died at the end of 1901; cause of death not known.

1784. A carcinoma of the rectum removed by operation. The growth forms an irregular ulcer 4·5 cm. in diameter, with a thickened and in parts everted border. Except at one edge of the specimen, where the tissues have been torn, the ulcer is surrounded by a narrow strip of apparently healthy membrane. 5663

From a woman, aged 58, in whom there was a history of alternating diarrhœa and constipation, with tenesmus, pain, and hæmorrhage, for 3 months. The growth was situated in the anterior and right aspects of the lower part of the rectum; it was removed with the cautery, after dividing the tissues back to the coccyx. A resulting stricture of the rectum was dilated in the following year; there were no signs of recurrence. (Surg. Reg. Rep. 1881, p. 31, No. 105.)

1785. A carcinoma of the anterior part of the rectum, removed by operation. The growth has a maximum diameter of 6 cm.; its surface is raised, the central part being coarsely warty and the peripheral part formed by larger polypoid projections. The growth is at all parts surrounded by a strip of apparently healthy mucous membrane. On the outer aspect of the bowel the tissues are infiltrated by the growth, and the lowest part of the peritoneum of the recto-vesical pouch, together with parts of the vesiculæ seminales and vasa deferentia, can be recognised. 7769

1786. The lower 11 cm. of a rectum, removed by operation for carcinoma and laid open. The growth forms an ulcer, which surrounds the bowel except for a distance of 15 mm.; it measures 5 cm. longitudinally, and its lower border is 2·5 cm. above the anus. The slightly depressed floor of the ulcer is surrounded by a prominent, raised, and in parts sinuous border of infiltrated mucous membrane. 8287

From a woman, aged 41, who was under the care of Mr. Godlee in June 1899. She had always been constipated; the symptoms of the disease dated from August 1898. The growth was incomplete anteriorly. The patient recovered from the operation.

1787. Part of a rectum, 8 cm. in length, together with the surrounding fat, removed by operation for an annular carcinomatous ulcer, and laid open. The longitudinal extent of the disease is 4 cm., and the upper and lower limits of the ulcer are bounded by infiltrated mucous membrane. The gut is greatly narrowed. 8810

From a man, aged 57. The symptoms of the disease were of 5 months' duration. The lower part of the rectum was excised after removal of the coccyx and last piece of the sacrum. (Mr. Godlee's *Case-books*, 1901, No. 1240.)

1788. Part of a rectum, excised for carcinoma and laid open posteriorly. The growth is situated in the anterior wall of the bowel and near the upper border of the part removed. It measures 6 cm. transversely and 5 cm. longitudinally. The upper and lower borders of the growth, especially the latter, are everted; but in the lateral borders of the growth the folds of the surrounding mucous membrane pass continuously on to its surface. In its central part the surface of the tumour is ulcerated and presents a deep longitudinal furrow with shelving borders. On the outer aspect of the bowel is seen the lowest part of the recto-vesical pouch of the peritoneum, the upper limit of the tumour extending 4 cm. above the lowest part of the pouch. 8666

From a man, aged 39, who was admitted into U. C. H., under the care of Mr. Godlee, Feb. 11, 1901. He had been losing weight for a year, and for 6 months had suffered from occasional hæmorrhage from the bowel and tenesmus. The part of the rectum preserved in the specimen was successfully excised, after removal of the coccyx, and last two pieces of the sacrum. (Mr. Godlee's *Case-books*, 1901, vol. i, p. 547.)

✓ ✓ Pelvic

1789. The pelvic viscera of a female, the lower part of the rectum being the seat of a tumour. The growth extends from the anal canal upwards for a distance of 8 cm., and involves the whole circumference of the bowel. The wall of the latter is greatly thickened by the growth, and in the section the hypertrophied muscular coat can be clearly seen with a thick layer of growth external to it. In the whole extent of the disease the lumen of the rectum is much narrowed and the inner surface, which is entirely devoid of mucous membrane, presents at the lower part several prominent longitudinal columns separated by deep sulci. The growth is limited above by a prominent, rounded, and everted border, above which the mucous membrane is healthy. The vagina and bladder are healthy. The peritoneum of Douglas's pouch is thickly coated with a layer of inflammatory exudation. 5515

1790. The parts concerned in the operation of left lumbar colotomy, which was performed in the case from which the preceding specimen was obtained. 5516

From a woman, aged 35, who was admitted into U. C. H., under the care of Mr. Beck, on Sept. 25, 1880. She had suffered from *fistula in ano* for 8 years; the symptoms of carcinoma of the bowel had existed 12 months. On admission the abdomen was distended and there was occasional vomiting. Left lumbar colotomy was performed on Sept. 27. Great abdominal distension persisted and on several occasions was relieved by puncturing the abdominal wall with a fine trochar and canula. Death occurred on Oct. 30. The abdominal cavity was occupied by a large cavity containing gas, resulting from perforation of an ulcer in the cæcum. (Mr. Marshall's *Case-books*, 1880, vol. i, p. 290.)

1791. Part of the abdominal wall, together with part of the sigmoid colon, concerned in the operation of left inguinal colotomy. The proximal part of the intestine lies below the distal part and is distinguished from it by its larger size.

At the artificial anus the proximal portion of the bowel has prolapsed and above it is seen the contracted opening of the distal portion. 6457

The operation was performed on a man, aged 60, in whom there was an extensive carcinoma of the lower part of the rectum. (Surg. Reg. Rep. 1889, p. 73, No. 136.)

DISEASES OF THE THYROID GLAND.

ATROPHY OF THE THYROID GLAND.

Atrophy of the thyroid gland may occur as a senile change, and is also met with in myxœdema and some forms of cretinism. In myxœdema the gland consists almost entirely of fibrous tissue in which are the remains of vesicles, without colloid contents (1793).

1792. The larynx and part of the trachea, together with the thyroid gland. The thyroid gland is atrophied; the lateral lobes measure 3·5 cm. in length and 14 mm. in breadth at their lower part. The lobes are connected by a very slender isthmus, which is slightly enlarged to the left of the middle line. 8347

Microscopic Structure.—A section of the gland consists almost entirely of fibrous tissue, in which are a few collections of atrophied vesicles, containing no colloid material. In some parts the glandular epithelium is represented by small groups of polygonal cells surrounded by a scanty round-cell infiltration; in other parts a few vesicles remain.

From a woman, aged 59, who was admitted into U. C. H. on Nov. 7, 1899. On the previous evening she fell and struck the left side of the head against a table, and lay on the floor, not actually unconscious, for 2 hours; on the following morning she was still dazed and at 2 P.M. became unconscious. On admission she was still unconscious; the limbs on the right side seemed more flaccid than on the left; breathing laboured; pulse 64; body very fat; face pale and flabby, eyelids very puffy; urine solid with albumen. Hot-air baths were administered and venesection performed; death occurred on the following day. It was stated that for a month the patient had been very heavy and sleepy and slow in her movements. At the *post mortem* examination an extravasation of blood was found beneath the left temporal muscle and also hæmorrhage on the surface of the left hemisphere and into the left lateral ventricle, with breaking down of the brain-substance around the descending cornu. The left ventricle of the heart was greatly hypertrophied and the aorta atheromatous; the kidneys "looked normal." (Dr. Ringer's *Case-books*, 1899, Females, p. 268.)

1793. The thyroid gland, together with the neighbouring parts, from a case of myxœdema. The gland is small, thin, and fibrous-looking. 6368

Microscopic Structure.—The stroma is everywhere represented by dense fibrous tissue, in which are scattered, at distances varying from a few millimetres to 1 cm., minute foci or collections of leucocytes. The sole remains of the gland-tissue are a few shrunken and degenerated epithelial cells buried in the collections of leucocytes. The stroma is fairly vascular, the wall of the vessels being normal.

From a man, aged 50, who was an inmate of Bethlem Hospital under the care of Dr. Savage, suffering from delusions and hallucinations of sight and hearing. Symptoms of myxœdema had been noticed for 6 months before the patient's death. (Clin. Soc. Trans., Myxœdema Report, vol. xxi, Suppl. Case 100.)

GOITRE. BRONCHOCELE.

The simple chronic enlargements of the thyroid gland include two chief forms: (1) General Enlargement; and (2) Enlargement due to the presence of one or more adenomatous tumours in the gland. In the former the enlargement affects the whole gland more or less uniformly and the usual operative treatment consists in *extirpation* of part of the gland; in the latter the enlargement is often confined to one part of the gland and the encapsuled tumour can be removed by *enucleation*.

General Enlargement of the Thyroid Gland.

Parenchymatous Goitre.—In this, the most common form, the gland is more or less uniformly and often considerably enlarged. The normal structure of the gland is usually closely preserved, and thus in section the goitre presents a finely spongy appearance, due to the presence of closed vesicles filled with colloid material (1794).

Cystic Goitre is a modification of the parenchymatous enlargement resulting from the conversion of part of the gland-tissue into cysts, which render the enlargement less regular and more lobulated. The cysts contain colloid material or thin fluid, often mixed with blood (1795, 1797).

Fibrous Goitre results from the excessive development of fibrous tissue in a parenchymatous enlargement. It is not common.

The most common pressure-effect of an enlarged thyroid gland is upon the trachea, which is compressed laterally so as sometimes to become scabbard-shaped in section.

1794. An enlarged thyroid gland, together with the larynx and part of the trachea. The two lobes are almost equally affected, and measure vertically about 9 cm., reaching upwards to the superior cornua of the thyroid cartilage. In the middle line the two lobes are in contact for a distance of 5 cm. below the lower border of the thyroid cartilage; in the upper part of the sulcus between the two lobes is the isthmus, which does not appear to be enlarged. From the inner part of the upper border of the left lobe a secondary lobule, representing the enlarged pyramid, projects in front of the thyroid cartilage. The trachea, which does not appear to have been displaced from the middle line, occupies a deep sulcus between the enlarged lobes, and presents a moderate degree of lateral compression. The surface of the enlarged gland is slightly lobulated, and a section of the left lobe presents a fine vesicular structure, the meshes of which are filled with yellowish-brown colloid substance. 6855

Microscopic Structure.—The enlarged gland exactly corresponds in structure with that of the normal thyroid.

From a woman, aged 46, who died from carcinoma of the ileo-colic valve and pericæcal abscess. (Mr. Barker's *Case-books*, 1892, vol. i, p. 334.)

1795. An enlarged and cystic thyroid gland, together with the larynx and part of the trachea, divided horizontally. The enlargement, which involves the whole gland, but the right lobe more extensively than the left, forms an irregularly quadrilateral, lobulated mass, measuring 13 cm. transversely and 10 cm. vertically. On the surface of the section, the trachea is seen to be surrounded by the gland except behind, where its posterior surface is exposed in a deep sulcus; the trachea itself is slightly compressed laterally. The cut surface of the tumour shows it to have throughout a lobulated structure; the individual lobules are mostly rounded or oval in outline; the smaller ones are composed of an irregular meshwork containing colloid material, whilst some of the larger lobules, most noticeably one in the anterior part of the left lobe, are cystic and filled with coagulated mucoid fluid. 8124

Microscopic Structure.—The enlarged gland consists of large vesicles containing colloid, which in some of the spaces is mixed with altered blood.

From a woman, aged 54, who died after the removal of a large retroperitoneal lipoma. (Dr. Spencer's *Case-books*, 1898, Healy, No. 2114.)

1796. A slice of one of the enlarged lobes of the thyroid gland from a case of acromegaly. The section presents a number of irregular cystic spaces separated by fibrous septa. No normal gland-tissue can be recognised. 6995

Microscopic Structure.—The gland has undergone extensive fibro-cystic change, but in some parts vesicles containing colloid are present.

From a woman, aged 47, who presented the characteristic symptoms of acromegaly. Death occurred in 1893 from asthenia (Godlee, Clin. Soc. Trans. 1888, vol. xxi, p. 196). The enlarged pituitary body is preserved in the Medical Series.

1797. A thyroid gland, uniformly increased in size by the development of cysts within it. Its surface is lobulated. The section (made through its left lobe) presents numerous closely packed cysts, varying from the smallest size perceptible to 1 cm. in diameter. In some cysts the contents are pale brown and colloid; in the larger spaces they are opaque, white, and cheesy. Between the two kinds of contents intermediate stages are discoverable. The cysts are arranged in lobules, united by lines of fibrous tissue. 551

From a patient who died of carcinoma of the uterus.

1798. The right lobe of a thyroid gland, removed by operation. The surface of the gland, except where accidentally lacerated, is slightly lobulated and invested with a thin capsule. The section of the lobe presents the appearances of normal thyroid gland-tissue, traversed by well-marked fibrous septa; at the larger end is a collapsed cyst. 8001

Microscopic Structure.—The structure is that of the normal thyroid gland.

From a girl, aged 17, who had suffered from shortness of breath for 5 or 6 years and swelling of the neck for 1 year. On admission the breathing was loud and stridorous, especially during sleep, and there was dyspnœa, which rendered the recumbent position impossible. There was enlargement of the thyroid gland, most marked on the right side; the trachea was slightly displaced to the left. The right lobe was extirpated through an incision along the anterior border of the right sterno-mastoid; it extended downwards behind the sternum and inwards between the trachea and œsophagus. The difficulty in breathing was entirely relieved by the operation. (Mr. Godlee's *Case-books*, 1898, vol. i, p. 156.)

ADENOMATA AND CYSTIC ADENOMATA OF THE THYROID GLAND.

An adenoma or cystic adenoma of the thyroid gland occurs as an encapsuled tumour, which displaces, but does not involve, the adjacent gland-tissue, from which it can be separated by enucleation (1799, 1808). An adenoma may imitate in its structure that of the fœtal (1800), or more commonly the adult, thyroid gland (1802). In a cystic adenoma the relative proportion of the cystic to the solid portion varies. The cystic change may advance to such a degree that the whole tumour is represented by a single thick-walled cyst, in the wall of which remains of the adenomatous tissue can, however, usually be still seen (1811). The contents of the larger cysts are usually freely mixed with blood, so that a section of the tumour may closely resemble that of an aneurism (1805). The wall of a cystic adenoma may undergo calcification (1813).

A single adenoma, or cystic adenoma, is not uncommonly associated with some degree of general enlargement of the gland, whilst in some cases multiple adenomatous tumours are embedded in the substance of a parenchymatous goitre (1809). The trachea may be considerably displaced to one side of the middle line by a tumour in one of the lateral lobes, and some degree of lateral compression in common (1810). An adenoma of the thyroid sometimes lies, in a considerable part, behind the sternum (1808).

1799. An adenoma of the thyroid gland, bisected. The tumour is 8 cm. in its longest diameter; its surface is smooth and covered in all parts by a fibrous capsule. The cut surface presents a dense, bluish-white, fibrous, central portion, surrounded by a brown translucent tissue composed of a delicate meshwork containing colloid substance. Small recent hæmorrhages are present in the tumour. 8582

Microscopic Structure.—There is an abundant finely fibrillated stroma, in which are vesicles containing colloid substance mixed with altered blood. Small buds of epithelial cells extend from the vesicles into the surrounding stroma.

From a woman, aged 39, in whom a tumour of the neck had been noticed for 4 years. For 2 years there had been dyspnœa and for 1 year loss of voice. The tumour was situated in the right lobe of the thyroid gland; the left lobe was slightly enlarged. The trachea was displaced to the left of the middle line; there was slight stridor with complete aphonia. The patient was very neurotic, the breathing was difficult. The tumour was removed by enucleation. The aphonia persisted after the operation. (Mr. Heath and Mr. Pollard's *Case-books*, 1900, p. 583.)

1800. A large solid adenoma of the thyroid gland. The surface of the tumour is smooth, slightly lobulated, and covered with a delicate fibrous capsule. The tumour on section is homogeneous and of a yellowish-white colour; there are no cysts or colloid substance, but the central part presents scanty radiating bands of fibrous tissue. 7503

Microscopic Structure.—The tumour consists of alveoli filled with small spheroidal cells. The alveoli are surrounded by a delicate fibrous wall, and between the alveoli are a large number of wide, thin-walled, capillary blood-vessels. There is no colloid substance.

1801. A solid ovoidal adenoma of the thyroid gland. The smooth slightly lobulated surface is covered with a fibrous capsule. Except at the centre, which is firm and apparently fibrous, the section of the tumour is slightly granular and presents a few minute cysts and slight discoloration from hæmorrhage. 7978

Microscopic Structure.—The tumour consists of small closely packed acini, lined with cubical or spheroidal cells. A few of the acini contain colloid material.

From a boy, aged 13, in whom a swelling had been noticed on the right side of the neck since birth. It had gradually increased in size; there was shortness of breath on exertion. The swelling extended from the angle of the jaw to the sternum, reaching outwards on the right side beneath the sterno-mastoid, and on the left side to the anterior border of the sterno-mastoid. The movement of the tumour during deglutition was very slight. The tumour was enucleated after reflecting a layer of connective tissue with numerous large veins from its surface. (Mr. Godlee's *Case-books*, 1898, vol. i, p. 150.)

1802. Part of an adenoma of the isthmus of the thyroid gland. The tumour is oval and measures 5 cm. in its longer diameter; the surface is covered with a fibrous capsule, over which is a layer of the gland-tissue of the isthmus. On section the central part of the tumour presents a fibrous structure; in other parts a fine meshwork containing colloid substance is mixed with solid homogeneous areas. 6652

Microscopic Structure.—The tumour presents the structure of the normal thyroid gland, except that the acini are smaller than natural. Among the acini are solid columns of cubical cells in a soft fibrous stroma.

From a girl, aged 17, in whom a swelling of the neck had been noticed for 9 months, and had been painted with iodine. For 2 months the swelling had been increasing, and caused pain and dyspnœa. The tumour reached from the lower border of the thyroid cartilage nearly to the sternum; it moved with the larynx. It was removed together with the isthmus after ligaturing the narrow bands of thyroid tissue which united the latter with the lateral lobes. (Mr. Beck's *Case-books*, 1891, vol. i, p. 113.)

1803. A small adenoma of the thyroid gland. Its substance is gelatinous, and its surface smooth and covered with a delicate fibrous tissue. 8115

Microscopic Structure.—The colloid substance is abundant and the epithelial lining of the vesicles flattened.

1804. A small piece of a thyroid gland, divided through the centre of an adenoma which is embedded in its substance. The yellow substance of the tumour is surrounded by a white fibrous capsule. 8929

Microscopic Structure.—The tumour is surrounded with a thick fibrous capsule, and is composed of small vesicles, only a few of which contain any colloid substance.

1805. A cystic adenoma of the thyroid gland, in section. The tumour measures 9 cm. in its longest diameter. It is slightly lobulated and surrounded at all parts by a thick fibrous capsule.

The central part of the tumour is occupied by a large cavity filled with partly decolorised blood-clot, the outer layers of which are indistinctly laminated. This cavity is surrounded by an incomplete fibrous wall, which, at the upper part of one of the sections, is calcified. Between the wall of the central cyst and the fibrous capsule of the tumour is an irregular layer of solid growth, which in one of the sections has a maximum thickness of 16 mm. 8526

Microscopic Structure.—The solid tissue surrounding the central cyst consists of small colloid-containing vesicles which in most parts are widely separated by dense hyaline fibrous tissue. The tumour was removed by enucleation.

1806. An adenoma of the thyroid gland, in section. It is completely encapsuled, and the cut surface presents a fine spongy structure containing colloid substance, and freely intersected with cleft-like spaces. 7977

Microscopic Structure.—The vesicles vary much in size, but all contain colloid. Some of the largest spaces are cleft-like. Many of the spaces are very small and are almost filled by the epithelial lining.

From a woman, aged 25, in whom a swelling of the neck of one year's duration had been treated with iodine. There had been shortness of breath for a few months. A tumour, as large as a hen's egg, occupied the position of the left lobe of the thyroid gland; the right lobe was slightly enlarged. The tumour was removed by enucleation. (Mr. Godlee's *Case-books*, 1898, vol. i, p. 154.)

1807. A small cystic adenoma of the thyroid gland. The wall of the cyst is thick, and presents a few colloid vesicles in its inner layers. 8092

Microscopic Structure.—A section of the wall of the cyst shows vesicles containing colloid, lying in a laminated richly cellular fibrous tissue.

1808. The left lobe of a thyroid gland, together with a large adenoma, attached to its lower and inner part. The enlarged lobe is 8 cm. in length, and presents a lobulated surface, on the posterior and inner aspect of which is a shallow vertical sulcus, corresponding with the position of the larynx and trachea. The adenoma is oval in shape, the lower end being the larger, and has a vertical measurement of 6 cm. The tumour is only loosely attached to the enlarged lobe by connective tissue. 7740

From a man, aged about 52, who was under the care of Sir Victor Horsley. The adenomatous tumour extended downwards behind the sternum and caused dyspnœa by its pressure on the antero-lateral wall of the trachea. The left lobe with the tumour attached to it was successfully removed by operation.

1809. Several encapsuled adenomata, removed by operation from a thyroid gland. A section has been made of the largest tumour, which measures 4·5 cm. in its longest diameter; the tumour is divided into lobules and consists of a fine mesh-work containing colloid substance; one or two small cysts and a minute calcareous deposit are exposed on the surface of the section. 7607

From a woman, aged 40, who was admitted into U. C. H. on account of shortness of breath and pain in both sides of the neck, extending to the ears. The swelling of the neck had not been observed, and the patient had been treated for asthma. The whole thyroid gland was enlarged, but especially the left lobe. The tumours preserved in the specimen were enucleated from the left lobe and isthmus. (Surg. Reg. Rep. 1896, p. 86, No. 950.)

1810. A tongue, larynx, and parts of the trachea and œsophagus, together with the thyroid gland, the right lobe of which is the seat of a large cystic adenoma. The left lobe of the thyroid gland is slightly enlarged. The tumour of the right lobe is oval in shape, and measures 9 cm. in its longer, vertical diameter. The section of the tumour displays a dense fibrous cyst-wall, about 4 mm. in thickness, enclosing an irregularly laminated substance, varying in colour from pale yellow to deep brown, and probably composed almost entirely of altered blood. The glandular tissue of the right lobe is flattened out on the inner and anterior aspects of the tumour. The trachea and œsophagus are displaced to the left and curve around the inner and posterior aspect of the tumour, the trachea being considerably compressed in an antero-lateral direction. 6265

From a woman, aged 57, who died of Bright's disease with general œdema. She was born in Derbyshire, and the tumour in the neck was first noticed at the age of 16. The patient's mother had a similar tumour. (Dr. Bastian's *Case-books*, Males, 1887, p. 775.)

1811. A large cystic adenoma of the thyroid gland, in section. The dense fibrous wall of the cyst has a maximum thickness of 7 mm. Along the posterior aspect of the specimen a thick layer of adenomatous tissue is present on the inner surface of the fibrous capsule, and similar but much smaller deposits are present in other situations. The remainder of the tumour is occupied by an irregular cyst, completely filled with brown coagulum irregularly mixed with broken-down tissue.

From a woman, aged 21, under the care of Mr. Stonham. A tumour of the neck had been present since infancy, and during the 2 months before operation it had rapidly increased in size, causing pain and difficulty in swallowing. The cyst, which was connected with the left lobe of the thyroid gland, was tapped and injected with iodine, after which the patient became very feverish and ill, and acute inflammation of the tumour occurred. The cyst was subsequently removed by operation.

The patient was quite well 4 years later.

1812. The larynx and trachea of a child, together with the thyroid gland, in connection with the isthmus of which is a solid tumour, 5·5 cm. in its transverse diameter. The tumour lies exactly in the middle line, in front of the larynx and the upper part of the trachea. The lobes of the thyroid gland are connected with the sides of the tumour, and appear to be continued into a layer of gland-tissue on its upper surface. The tumour, as exhibited by the section, is composed of a central, greyish, semitranslucent substance and of a peripheral portion, which is opaque and of a deep yellow colour. 4087

Microscopic Structure.—The condition of the specimen renders microscopic examination unsatisfactory. The tumour appears to be composed of alveoli filled with spheroidal cells and without any colloid substance.

1813. A calcified cyst of the thyroid gland, divided and dried. It is 23 mm. in diameter, and the calcified wall has a maximum thickness of about 2 mm. In one situation the cyst is markedly flattened by the presence of a second similar cyst, which has not been opened. 2657

From the dissecting-room.

1814. A larynx and trachea, together with the thyroid gland, in connection with the left lobe of which is a cystic adenoma. The isthmus of the gland is normal, and the right lobe, which is somewhat elongated, lies along the side of the trachea as low as the eleventh ring. The upper border of the left lobe is on a level with the crico-thyroid space and in its lower part the cystic adenoma, which has been laid open, forms a large rounded tumour, which reaches downwards to the level of the bifurcation of the trachea. The wall of the cystic tumour is in part calcified and into its interior irregular masses of tumour-substance project. The trachea is slightly displaced to the right, and in its upper part presents well-marked lateral compression. 3653

From a man, who was admitted into U. C. H. for stone in the bladder; no operation was performed. Death was caused by asphyxia from pressure on the trachea, a sudden increase in the size of the tumour having resulted from extensive hæmorrhage into it.

1815. The larynx and part of the trachea of an infant, together with three solid tumours attached to the upper part of the trachea in the situation of the thyroid gland. The largest tumour, which lies on the right side, is attached to the front of the trachea by a stout fibrous cord 1 cm. in length; it is ovoidal in shape, 12 cm. in length, and divided on its surface into large lobules. On the left side a smaller oval tumour, 8 cm. in length, is attached to the trachea by a slender fibrous pedicle 2·5 cm. in length. Between these two tumours and attached to the front of the trachea at the same level is a third much smaller one, 4 cm. in its greatest diameter. Each tumour is covered with a thin fibrous capsule. On section the smallest tumour is fleshy and presents a more fibrous central part with faint radial striation around. The two larger tumours present on section a similar structure, except that cysts are present, the largest measuring 2·5 cm. in diameter. In its upper part the trachea is almost completely flattened by lateral compression. 8852

Microscopic Structure.—The tumour consists of very irregular alveoli filled with small spheroidal cells. It is intersected by dense fibrous septa, in parts of which calcification has occurred. There is no colloid substance.

Exophthalmic Goitre.

The enlargement of the thyroid gland found in Graves's disease is usually uniform and moderate in degree. The gland is of fleshy consistence and on section presents a solid, more or less homogeneous appearance, the usual vesicular structure of an ordinary goitre being either absent or but little marked (1816). Microscopically the gland differs from an ordinary goitre in that the ordinary vesicles are replaced by irregular alveoli lined with an exuberant, and often columnar shaped epithelium. These alveoli contain no colloid substance.

Enlargement of the thymus gland is almost constantly present (1816).

1816. The thyroid and thymus glands, together with the heart and large vessels and the larynx and trachea, from a case of Graves's disease. The thyroid gland is considerably enlarged; both lobes rise to the level of the upper border of the thyroid cartilage; in a vertical direction the right lobe measures 8 cm. and the left lobe 7 cm., the two lobes being united by a short isthmus. Posteriorly the two lobes meet in the middle line, the trachea and œsophagus, both laterally compressed, lying in the sulcus between them. The surface of the gland is very slightly lobulated; the consistence is uniformly fleshy, and the substance of the gland, as displayed by a section of the left lobe, is divided into small irregular areas by delicate fibrous septa, some of the areas being solid and homogeneous, but others minutely vesicular; no colloid substance can be seen with the naked eye.

The thymus gland is uniformly enlarged; it reaches above to the lower border of the thyroid gland and below overlaps the anterior surface of the heart, having a vertical measurement of 10·5 cm.

The heart is not hypertrophied, and the thyroid arteries are of normal size. 7022

Microscopic Structure.—In some parts the gland consists of vesicles containing colloid substance; the latter is extensively vacuolated, and the cells lining the vesicles are more columnar than natural. In most parts the vesicles are replaced by large irregular alveoli, into which distinct papillary outgrowths of the wall project; the spaces are lined with cubical epithelium, which in some spaces has proliferated so that the lumen is completely filled with a mass of spheroidal cells.

The enlarged thymus retains its normal structure.

From a girl, aged 14, who was admitted into U. C. H., under the care of Dr. Bradford, Sept. 3, 1893. Swelling of the neck was first noticed in Jan. 1892, and prominence of the eyes in July 1893. There had been frequent attacks of rapid action of the heart. The enlargement of the thyroid gland, exophthalmos and exaggerated pulsation of the vessels of the neck, were well marked. Temperature normal; pulse 116–136; respiration 20–26. On Sept. 28 the pulse was 172, and breathing very laboured. Death occurred suddenly from heart failure on Sept. 29. (Dr. Ringer's *Case-books*, Females, 1893, p. 711.)

1817. The thyroid and thymus glands, together with the larynx and part of the trachea, from a case of Graves's disease. The thyroid gland is slightly enlarged, the lateral lobes having a vertical measurement of 5·5 cm. From the upper border of the left part of the isthmus an enlarged pyramidal lobe projects upwards in front of the left ala of the thyroid cartilage. The surface of the gland is slightly lobulated, and its consistence is uniformly firm. A section of the left lobe displays a solid yellowish substance, with at one spot a small brownish area with a minutely vesicular structure.

The enlarged thymus gland is 10 cm. in length. 7480

Microscopic Structure.—The gland presents two distinct types of structure. In some parts there are colloid-containing vesicles, like those of an ordinary parenchymatous goitre. In other parts the lobules are composed of irregular acini, the epithelium lining which has proliferated so as in some of the spaces completely to fill the lumen; the irregular shape of the spaces is partly due to convolution of the walls; the spaces contain no colloid.

The thymus retains its normal structure.

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From a woman, aged 22, who was admitted into U. C. H. Oct. 15, 1896. The symptoms began with palpitation 2 months before admission; for 6 weeks there had been swelling of the neck and prominence of the eyes. The pulse-rate rose from 130 to 210; headache was a prominent symptom. On Oct. 24 vomiting began, and remained a constant symptom until the patient's death on Dec. 5. (Dr. Roberts's *Case-books*, 1896, Females, p. 174.)

✓ **1818.** An enlarged thyroid gland, together with the larynx and part of the trachea, divided longitudinally. The enlargement involves the whole gland, but the left lobe is larger than the right. The trachea, which, except posteriorly, is closely surrounded by the gland, is slightly compressed laterally. The section of the gland displays a homogeneous solid substance, divided into small irregular lobules, and a few small cysts containing coagulated mucoid fluid, the largest situated on the surface of the right lobe. 7787

Microscopic Structure.—The gland consists of small alveoli, separated only by slender fibrous septa. The alveoli are lined by epithelium, which in some of the spaces forms a single layer of cubical or columnar cells, and in others completely fills the lumen. In only very few of the spaces is any colloid substance present.

From a case of Graves's disease.

Malignant Disease of the Thyroid Gland.

Carcinoma, usually of the spheroidal-cell variety, and *Sarcoma*, especially round-cell, occasionally occur in the thyroid gland and most commonly arise in a gland which is already the seat of a simple goitre. The disease, at an early stage, tends to invade the structures outside the capsule of the gland. Thus the tumour may invade the wall of the trachea (1820), and may cause compression of the œsophagus and paralysis of the recurrent laryngeal and sympathetic nerves. Glandular enlargement may be a prominent symptom in both forms of malignant disease, but is inconstant (1819).

In one rare variety of carcinoma of the thyroid gland, pulsating secondary tumours occur, especially in the bones, which in their structure closely resemble that of the normal gland.

1819. A thyroid gland, which is the seat of a carcinoma. The main mass of the tumour has grown from the right lobe and forms a rounded mass 12·5 cm. in its longer, vertical diameter. This part of the tumour is invested by a fibrous capsule, through which, in places, the growth is protruding; the latter on section consists of a soft granular substance intersected by fibrous septa. On the inner aspect of the tumour is a deep vertical sulcus, in which lies a separate lobule, 9 cm. in length; this presents on section, in parts, a cystic structure and probably represents the enlarged right lobe of the thyroid gland, in which the disease originated. The isthmus remains as a fibrous cord 4 cm. in length, connected with the lower end of the tumour above described; in this cord is a solid nodule, as large as a filbert nut, which in section presents a granular appearance, unlike that of normal thyroid tissue. The left lobe is represented by an irregularly pyramidal and slightly lobulated mass, 6·5 cm. in length; in section this lobe is soft and granular and the seat of extensive hæmorrhage. 7379

Microscopic Structure.—The tumour consists of spaces filled with spheroidal cells, in many of the spaces the central cells having degenerated into a granular mass. The secondary glandular growth had a similar structure; the spaces were less distinct.

From a man, aged 43, in whom a swelling in the right side of the neck had been noticed for 11 years. During the last 12 months the tumour had greatly increased in size and another swelling formed behind it. On admission into U. C. H., the patient was wasted; the tumour of the right lobe of the thyroid gland reached upwards to within 1½ inch of the lobule of the ear, and downwards to within a finger's breadth of the clavicle; it moved with the larynx during deglutition; the trachea was displaced nearly 3 inches to the left of the middle line. The slightly enlarged left lobe of the gland could be easily felt. In the right posterior triangle was a lobulated mass of enlarged glands reaching from the ear to the clavicle and separated by a distinct sulcus from the thyroid tumour itself. There was no dyspnœa, but considerable difficulty in swallowing; the temperature was often above normal, four times reaching 102°. The case being considered inoperable, the patient was discharged and died a few weeks later. (Surg. Reg. Rep. 1889, p. 48, No. 538.)

1820. A thyroid gland, together with the larynx and parts of the trachea, œsophagus, and large vessels. Enveloping the larynx on the right side is a large tumour, which has arisen apparently in the right lobe of the thyroid gland. The new growth is somewhat globular and about 7 cm. in diameter; superiorly it reaches as far as the upper border of the thyroid cartilage. The carotid vessels and pneumogastric nerve of the right side lie embedded in its outer surface. The right ala of the thyroid cartilage is almost lost in the mass of the tumour. Posteriorly the growth has extended between the mucous membrane of the pharynx and the back of the cricoid cartilage, and partially surrounds the upper part of the œsophagus. The growth has extended also below the cricoid cartilage for some distance upon the trachea, and has spread into the air-passages; in the last situation it has destroyed an oval area of the mucous membrane, and is itself deeply ulcerated, portions of the cricoid cartilage and first two rings of the trachea lying bare at the bottom of the ulcer. The growth is intimately adherent to the parts around it. The tumour, as displayed by the section, consists of a firm, greyish, semitransparent basis, pervading which is a network of opaque yellowish or white material. In the lower part of the section is an irregularly oval area, in which the two substances are less uniformly mingled. The left lobe of the thyroid gland is enlarged, but does not appear to be the seat of new growth. 1608

Microscopic Structure.—The condition of the specimen renders microscopic examination unsatisfactory, but the tumour is probably a spheroidal-cell carcinoma.

1821. A carcinoma of the thyroid gland, together with the pharynx and trachea. The tumour forms a somewhat flattened quadrilateral mass, 11 cm. in vertical, and 9·5 cm. in transverse measurement. The surface of the tumour is smooth and invested at all parts with a fibrous capsule. The lower border of the tumour is thick and rounded, and above this the anterior surface presents a shallow depression, probably corresponding with the level of the upper border of the manubrium. The tumour lies exactly in the middle line and does not reach higher than the natural level of the isthmus, from which it appears to have grown. Projecting above the tumour are the lobes of the thyroid gland, the right lobe being only partly present. The left lobe presents no general enlargement, but connected with its antero-external aspect is a cystic adenoma, 4 cm. in its largest diameter. The posterior surface of the tumour presents a shallow vertical furrow, in which lies the trachea, the latter presenting well-marked antero-posterior flattening. The substance of the tumour, as displayed by the section, is soft, friable, and blood-stained, and the cut surface is indistinctly divided into rounded areas. On the right side of the lower end of the trachea is a calcareous lymphatic gland. 8919

Microscopic Structure.—The tumour consists of large alveoli filled with richly protoplasmic epithelial cells, the distinction between the individual cells being ill-defined. The alveoli are separated by delicate strands of fibrous tissue and abundant blood-vessels. The secondary growth in the rib has a similar structure, but is not nearly so vascular.

From a woman, aged 39, who had suffered from an enlargement of the thyroid gland for several years. On admission into U. C. H. in 1902, secondary growths were detected in the sternum and ribs; the patient was partially paraplegic and died in a sudden attack of asphyxia. There were also secondary deposits in the lungs and spine.

The secondary growth in the sternum (No. 749 A), rib (749 B), and lung are preserved in the Museum. (Sir Victor Horsley's *Case-books*, 1902 Watson, No. 223.)

1822. A large sarcoma of the thyroid gland, together with the tongue and other adjacent parts, a sagittal section of the tumour having been made to the right of the middle line. The tumour consists of two main lobes, the right, of which the section has been made, being much the larger, whilst the left retains the shape of the left lobe of the thyroid gland. The surface of the tumour is lobulated. In front the left omohyoid lies on the surface of the tumour, whilst the right omohyoid and the left sternohyoid and sternothyroid muscles are incorporated with it. The upper extremity of the tumour reaches to the upper border of the thyroid cartilage, with which it is intimately connected. The larynx is tilted towards the left, and to the right of the middle line the tumour has extended into its interior as an irregular ulcerated surface. The trachea is compressed laterally between the two lobes of the tumour, which, before the parts were displaced, nearly met behind it. The upper end of the œsophagus is displaced to the left and the right lobe of the tumour bulges prominently into it. The lower extremity of the tumour reaches to within a finger's breadth of the arch of the aorta and partly surrounds the innominate artery. The substance of the tumour as displayed by the section is for the most part uniform, and intersected by lines of white fibrous tissue; part of the right lobe is extensively broken down, probably by hæmorrhage.

Microscopic Structure.—The tumour-cells, which are mostly of spindle-shape and sometimes of large size, are mixed with a few large, rounded cells, some of which are multi-nucleated. The stroma is abundant and fibrillated.

From a woman, aged 52, who was admitted June 13, 1879, into U. C. H., under the care of Mr. Heath. In the preceding January a tumour was first noticed in the right side of the neck; it slowly increased in size, but was painless. On admission there was a large tumour of the neck, affecting chiefly the right side. It reached on that side as far back as the trapezius, while on the left side it only extended to the posterior edge of the sterno-mastoid. Above, it reached to the angle of the jaw on each side, and to the hyoid bone in the middle line. Below, on the right side, it reached to the root of the neck, filling the posterior triangle, and overlapping the clavicle to such an extent as to reach to the level of the second rib, from which point a process extended across the middle line to the opposite clavicular region. The skin was stretched and discoloured, and the superficial veins distended. The tumour was nodular, with irregular but defined edges, elastic, but not fluctuating. Both external jugular veins coursed over the swelling; the left was dilated. The left sterno-mastoid could be traced over the tumour; the right could not be recognised. There was no actual pain, but the movement of the head, deglutition, and swallowing were much interfered with. The tumour moved up and down during deglutition. With the laryngoscope the larynx was seen to be displaced to the left. The right vocal cord was not paralysed; the left could not be seen. The voice was completely lost, and there was abundant watery expectoration. There was no exophthalmos. The heart was healthy. Temperature 99°; pulse 96.

No treatment was adopted, and the patient died rather suddenly ten days after admission.

There were several secondary growths in the lung.

1823. Three horizontal sections of a carcinoma of the thyroid gland. The tumour involves chiefly the right lobe of the gland, and in this situation forms a rounded mass nearly 6 cm. in diameter. In the upper section an extension from the right border of the tumour nearly surrounds the carotid artery. The section of the left lobe displays a mixture of tumour-substance and thyroid gland-tissue, the distinction between the white growth and the yellowish-brown, vesicular gland-tissue being very clear. The lateral parts of the tumour are connected in front of the trachea by the isthmus of the gland, which is infiltrated with growth, and in the lowest section has a thickness of 1 cm. The trachea is laterally compressed, the posterior extremities of its cartilaginous rings lying nearly in contact. The œsophagus is greatly compressed; in the lowest section it lies in a deep furrow between the two projecting lobes of the growth, behind the trachea; in the middle section the œsophagus is similarly placed, but adherent to the right lobe; in the upper section the œsophagus appears as an antero-posterior cleft 8 mm. in length, embedded in the right lobe of the growth. 8646

Microscopic Structure.—The tumour is a spheroidal-cell carcinoma. The alveoli are small and irregular, and the stroma scanty.

From an elderly woman. The tumour was of rapid growth and was at first thought to be inflammatory.

INJURIES OF THE AIR-PASSAGES.

WOUNDS OF THE AIR-PASSAGES. CUT-THROAT.

In this section are classed, for the sake of convenience, all specimens illustrating wounds of the throat, whether penetrating the air-passages or not. Wounds of the throat are divided according to their situation from above downwards. *Wounds above the hyoid* bone are rare; they implicate the root of the tongue, and seldom penetrate. *Wounds in the thyro-hyoid space* are common (1824, 1825); they frequently penetrate and wound the epiglottis, separating it more or less completely from the larynx, and extending backwards into the ary-epiglottic folds. The superior thyroid artery may be divided, and possibly the superior laryngeal nerve; the large vessels usually escape. *Wounds implicating the thyroid cartilage* seldom extend very deeply on account of the resistance offered by the parts. The great vessels are seldom wounded, as the cartilage lifts the razor off them as it is drawn across the neck unless great force is used (1826). *Wounds in the crico-thyroid space* are not uncommon. They may penetrate the œsophagus (1828) or great vessels. *Wounds below the cricoid cartilage* are very rare. The trachea, if completely divided, retracts considerably downwards, and much difficulty in treatment may result from this cause. Although the patient may escape immediate death from hæmorrhage, wounds of the throat are very fatal. Death may result from œdema glottidis in wounds of the thyro-hyoid space; but it is more commonly caused by scattered lobular pneumonia, apparently due to inhalation of the decomposing matter from the wound (1824).

1824. The larynx, with portions of the trachea, pharynx, and œsophagus, and the neighbouring soft parts of the front of the neck (the skin being removed), from a man who committed suicide by cutting his throat. The incision extends deeply into the thyro-hyoid space. On the left side the upper edge of the ala of the thyroid cartilage has been sliced off, and about 1 cm. below this the cartilage is deeply cut. On the right side there are two deeply incised wounds in the ala of the thyroid. The incision has divided more or less completely all the muscles attached to the lower border of the hyoid bone. Viewed from behind, the incision is seen to enter the pharynx immediately below the epiglottis, dividing its lower attachments and extending deeply into the left ary-epiglottic fold.

From a man, aged 60, who was admitted into U. C. H., under the care of Mr. Marshall, on November 17, 1880. In addition to the wounds shown in the specimen he had several deep scalp-wounds which he inflicted on himself with a hammer after he had cut his throat. There was little bleeding. The wound became somewhat sloughy in the middle, and the temperature rose to 103·2° F., and respiration to 40. Death occurred on Nov. 20.

There were patches of broncho-pneumonia in both lungs. Beneath one of the scalp-wounds was a slightly depressed fracture of the skull.

1825. The tongue, with the larynx and parts of the pharynx and trachea, from a man who committed sucide by cutting his throat. The parts have been divided between the hyoid bone and the thyroid cartilage; the epiglottis is separated from the larynx in front, but remains attached behind by the ary-epiglottic folds. On the right side the division of the soft parts extends to the lateral thyro-hyoid ligament; on the left, not quite so far. The thyro-hyoid muscle is strongly retracted, so as to leave uncovered the upper part of the ala of the thyroid cartilage on either side; the perichondrium of the parts so exposed is thinly covered with recent exudation. 545

1826. The tongue, with the larynx, trachea, and part of the arch of the aorta, from a case of cut-throat. The larynx has been completely severed through the upper part of the thyroid cartilage, immediately above the vocal cords, the whole of the epiglottis being detached from its lower connections; posteriorly the incision has passed through the summits of the arytænoid cartilages. On the left side the common carotid artery has been transversely divided immediately below the bifurcation; on the right side the carotid artery is uninjured.

1827. The tongue, with the larynx, the pharynx, and parts of the trachea and œsophagus, from a suicide. The larynx has been transversely and symmetrically laid open immediately below the vocal cords, the incision extending backwards as far as their posterior limit. The parts appear to have been twice cut, there being two deep incisions discernible in the left ala of the thyroid cartilage; the upper of these extends almost to the posterior margin of the cartilage, the lower for about half this distance; both the incisions are precisely parallel and run forwards, with a slight obliquity downwards. 5283

From a woman, 57 years of age, who died a few days after admission. There was profuse arterial hæmorrhage. (Sir J. Erichsen's *Case-book*, Females, 1866.)

1828. The tongue, with the larynx and trachea, pharynx, and portion of the œsophagus from a man who committed suicide by cutting his throat. The larynx has been completely severed in the interval between the thyroid and cricoid cartilages, the incision passing horizontally through the posterior half of the cricoid cartilage. Neither of the common carotid arteries is injured, but the wound passes on both sides nearly as far as the main vessels. The mucous membrane over the back of the cricoid cartilage is perforated in four or five places by irregular openings. 2279

1829. A tongue, with the larynx, pharynx, &c., and a portion of the integument of the front of the neck. The upper opening of the larynx is greatly distorted and reduced to a narrow transverse slit, prolonged for a short distance backwards between the arytænoid cartilages, which lie almost in contact and are displaced forwards so as nearly to touch the mucous membrane below the epiglottis. The epiglottis is drawn upwards on the right side, apparently after having been severed on this side from its lower attachment. Below its right border is a dense vertical cicatrix, from which other bands pass horizontally to the right wall of the pharynx. Below the lowest of these bands is a deep vertical sulcus, resulting from rotation of the cricoid cartilage. There is a deeply depressed transverse cicatrix in the skin of the front of the neck above the thyroid cartilage. 4271

The several deformities have most probably resulted from the contraction in the healing of an extensive wound implicating the central part and right lateral wall of the larynx, the primary injury having been followed by ulceration or sloughing of the injured tissues.

Foreign Bodies in the Air-passages.

Foreign bodies most commonly enter the air-passages from the mouth during inspiration, but occasionally a necrosed portion of one of the laryngeal cartilages or even a tuberculous gland, may ulcerate its way into the air-tube. Large soft bodies, such as masses of food, may block the pharynx, larynx, or trachea (1830), and cause rapid death from suffocation. A small irregular body may become arrested in the larynx above the vocal cords, sometimes in one of the ventricles. In this position the foreign body, if not causing a rapidly fatal asphyxia may occasion œdema of the larynx. A jagged body, such as an artificial tooth with its gold setting, may pass the vocal cords and be arrested at a lower point (1835). In other cases, a foreign body, having passed the glottis, enters one of the bronchi, in which it may become impacted (1837). Foreign bodies much more commonly enter the right than the left bronchus, because, on account of the greater size of the former, the angle between the two bronchi is situated on the left of the middle line. The most important result of the retention of a foreign body in one of the bronchi is the supervention of bronchiectasis in the corresponding lung (1836, 1837).

1830. A larynx and trachea, the latter in the lower 6 cm. of its length being blocked by a mass of chewed meat. 3653

From a man who died suddenly from asphyxia whilst vomiting, during recovery from the effects of an anæsthetic administered for the operation of circumcision.

1831. A triangular piece of compact bone, about 2 cm. in length, which was extracted from the right bronchus. 2759

From a woman, aged 37. The piece of bone entered the air passages, whilst the patient was eating some hashed mutton, and caused a fit of threatened suffocation, which was suddenly relieved as the foreign body became dislodged from the larynx. During the following 6 months the patient suffered from several "inflammatory attacks," with cough and expectoration. When the patient came under the care of Mr. Liston, inspiration was somewhat noisy, and a peculiar sonorous râle was heard below the right sterno-clavicular joint. Low tracheotomy was performed; a long pair of slightly curved toothed forceps was introduced for at least 3 or 3½ inches and the piece of bone extracted. The patient was speedily restored to perfect health.

This is the first recorded case in which a foreign body was discovered in and removed from the bronchus during life. (Liston's Practical Surgery, 4th edition, 1846, p. 415.)

1832. A small round bullet, 1 cm. in diameter, which was removed from the air-passages by inversion and shaking of the patient. 3685

From a Highland shepherd, aged about 20, who accidently allowed the bullet to slip from his mouth into the larynx on the evening of Dec. 28, 1844. A fit of violent coughing lasting uninterruptedly for 2 hours ensued, after which the patient suffered little inconvenience beyond an occasional dry cough until the middle of the following day, when he had rigors, headache, and deep seated pain in the right breast. On the following day the patient was drowsy; the face was pale and anxious; respiration was quick and somewhat difficult, a long inspiration increasing the pain in the chest; the pulse was feeble and irregular. It being concluded that the bullet had entered the right bronchus, the patient was securely strapped in a chair and suspended head-downwards from the rafters of the roof. He was then shaken by a rapid succession of sudden smart jerks, and after a few convulsive, retching coughs, spat the bullet from his mouth. Cough and pain in the chest continued for 2 days only, and at the end of a week the patient had returned to his work. (Liston's Practical Surgery, 4th edition, 1846, p. 421.)

1833. A small glass ornament, which was removed by tracheotomy from the trachea. 3686

From a boy, under the care of Mr. Liston. The foreign body had been in the air-passages several hours before it was removed.

1834. The greater part of a cherry-stone which was expelled from the air-passages. 3689

From a boy, aged 10 years, who was under the care of Mr. Quain in 1847. Laryngotomy was performed and about 20 minutes after the boy was put back to bed the stone was coughed up through the glottis.

1835. Two gold plates, each carrying two teeth. The lower was swallowed and passed *per rectum*; the upper was removed from the larynx by tracheotomy.

From a woman, aged 21, who was admitted into U. C. H. under the care of Mr. Heath, December 12, 1875. During the previous night she had an epileptiform fit, after which it was noticed that two plates, each carrying two artificial teeth which she was wearing were missing. She complained of pain in the left side of the neck, which was relieved after the passage of several probangs and bougies. The voice was slightly husky, and the breathing slightly stridulous. On Dec. 14, the breathing became more stridulous and there was some deficiency in the expansion of the left side of the chest. In the evening of the same day two white teeth were seen with the laryngoscope, lying in the trachea immediately below the larynx. On Dec. 15 tracheotomy was performed and the plate and teeth removed. On the same day the other plate was passed *per rectum*. (Mr. Heath, Medical Examiner, 1876, p. 45.)

1836. The rusty iron peg of a top, 3·5 cm. in length, which escaped from an abscess in the lung.

From a boy, aged 16, who was admitted into U. C. H., January 5, 1893, supposed to be suffering from empyema. There was a copious expectoration of offensive pus. There were signs of bronchiectasis on the left side, and pus was withdrawn with an aspirator. On questioning the patient he stated that 7½ years before he had "swallowed" the peg of a top; the symptoms began 18 months later and the expectoration became offensive 2 years after the accident. A piece of the left 9th rib was removed and the lung stitched to the pleura; subsequently an incision was made into the lung and a bronchiectatic cavity opened and drained. The expectoration became less but did not cease. Attempts were later made to remove the foriegn body by tracheotomy and inversion, &c. In Oct. 1894, the rusty peg came out through the drainage-tube which had been kept in the lung abscess. Complete recovery followed. (Mr. Godlee, Med.-Chir. Trans. vol. lxxix, 1896, p. 197.)

1837. The larynx and trachea, together with the right lung, from a case in which death followed the impaction of a collar-stud in the right bronchus. The bone stud lies with its broken larger end upwards at a distance of 4·5 cm below the bifurcation of the trachea and 2 cm. below the origin of the branch of the bronchus which passes to the upper lobe. The right bronchus is much larger than the left and continues the line of the trachea more directly. Immediately above the position of the stud, the mucous membrane of the bronchus is ulcerated and the corresponding cartilaginous rings exposed. The posterior surface of the lung is covered with firm fibrous adhesions, whilst the anterior and external surfaces, which corresponded to the position of an empyema, are thickly covered with granulation tissue. On the anterior surface are several depressed areas, the largest 5 cm. across, which correspond to gangrenous patches in the subjacent lung. A section of the lung displays an irregular cavity in the upper lobe, 4 cm. in diameter and surrounded by gangrenous lung-tissue. Throughout the section, especially in the lower lobe, are seen the mouths of dilated bronchial tubes, the lining of which is yellowish-brown and ulcerated, and the walls thick and fibrous. In the case of the smallest bronchial tubes the fibrous thickening is particularly well seen. At the upper end of the trachea is seen the opening made in tracheotomy. 8940

From a man, aged 19, who accidentally "swallowed" a bone collar-stud while bathing, in July 1900. A severe fit of coughing immediately followed, and on the 4th day right-sided pleurisy was diagnosed; the patient was in bed for three weeks, and five weeks later purulent expectoration began and the cough persisted. He was then thought to be suffering from phthisis and went to Australia, where he remained from January to May 1901. Dr. Verco of Adelaide failed to find tubercle bacilli in the sputum, and regarded the symptoms as due to the impaction of the stud in the right bronchus. On admission into U. C. H. on December 13th, 1901 there was copious expectoration of offensive greenish-yellow pus; there was impaired movement of the lower part of the right side of the chest. On Dec. 18 tracheotomy was performed and a wire hook passed down into the bronchus, but the stud could not be felt. On Jan. 3, 1902 parts of the 9th and 10th ribs of the right side were removed and the lung stitched to the parietal pleura; on Jan. 10 the lung was incised with Pacquelin's cautery and on Jan. 17 explored with a trochar but no cavity was reached; a canula was left in and the track subsequently dilated so as to admit a drainage-tube, from which however very little pus escaped. On Feb. 25 a considerable quantity of stinking pus escaped from the right pleura through the opening in the chest-wall. On March 5 the patient became drowsy; on March 7 there was weakness of the left side of the face; on March 8 there was also incomplete paralysis of the left arm and leg; the patient was comatose; the left eyeball was slightly prominent, eyelids swollen and conjunctiva œdematous. The right cerebral hemisphere was explored but no abscess found. Death occurred on March 9. There was suppurative phlebitis of both cavernous sinuses and meningitis spreading up over the motor area of the right side. (Mr. Godlee's *Case-Books*, 1902.)

DISEASES OF THE LARYNX.

Œdema of the Larynx.

Œdema of the larynx is usually the result of acute laryngitis and may thus be a serious symptom of the irritation caused by foreign bodies in, or wounds of, the air-passages and scalds of the pharynx and larynx. Œdema of the larynx is a not uncommon result of the various acute infective inflammations of the larynx, pharynx and neighbouring parts, as for instance in submaxillary cellulitis. It may occur in the course of the acute infective diseases.

Œdema of the larynx may prove a serious complication of various chronic laryngeal diseases, such as tuberculosis, syphilis, and malignant disease. It is occasionally met with in Bright's disease and other conditions attended with general or local œdema.

In œdema of the larynx the swelling is most marked in those parts in which the submucous tissue is most abundant; the epiglottis is swollen and rigid, and the ary-epiglottic folds may be so swollen as, in extreme cases, almost to meet over the rima glottidis (1841). The swelling rarely extends below the ventricular bands, the vocal cords usually escaping. In some forms of infective œdematous laryngitis, diffuse suppuration occurs in the submucous tissue, the swollen parts then presenting a yellowish tint mottled here and there with dark red (1840).

1838. A larynx, with parts of the trachea and œsophagus. The mucous membrane of the upper part of the larynx is greatly swollen from inflammatory œdema. The œdema ceases below at the ventricular bands. The effusion has occurred in greatest amount in the loose submucous tissue of the ary-epiglottic folds and the epiglottis. 2159

1839. A larynx, with the pharynx and portion of the œsophagus, &c. Inflammatory effusion has occurred in the tissues beneath the mucous membrane of the upper opening of the larynx and that covering the back of the cricoid cartilage. The lower limit of the swelling in the later situation is well defined. Both the tonsils are enlarged. 541

The patient died of acute inflammation, giving rise to suppuration under the mucous membrane of the back of the pharynx.

1840. A wax model of a tongue, with the larynx and pharynx. The submucous tissue of the ary-epiglottic folds, and that lying on the back of the cricoid cartilage, is greatly swollen. Points of extravasation exist in or immediately beneath the mucous membrane; but the tissues themselves are represented bloodless and pale, with patches of yellow here and there indicating the presence of pus in the submucous tissue. The upper opening of the larynx is reduced by the swelling to very small oval aperture. 2506

1841. A wax model of the larynx, root of the tongue, and upper part of the pharynx. The mucous membrane of the upper opening of the larynx is greatly distended by inflammatory effusion into its submucous tissue. The epiglottis is swollen, erect, and rigid. The effusion extends also to the base of the tongue and fauces. 4813

"From a fever-patient." The preparation shows clearly that in inspiration the swollen folds of mucous membrane would be drawn in a valve-like manner, so as completely to close the glottis. In expiration they would be separated by the current of air coming from below. It is this condition that makes expiration comparatively easy, and inspiration almost impossible in œdema of the larynx.

Simple Ulceration of the Larynx.

Small superficial ulcerations may occur as the results of simple chronic laryngitis, although more commonly there is merely redness and thickening of the mucous membrane. Ulceration may occur as a secondary consequence of wounds or injuries of the larynx (1843). Acute ulceration occasionally occurs without evident cause (1842).

1842. A larynx, with portions of the pharynx and œsophagus. In the mucous membrane forming the right ary-epiglottic fold is an irregularly oval ulcer extending backwards over the posterior surface of the arytænoid cartilage, and for a short distance within the larynx below the epiglottis; the edges of the ulcer are sharply defined, flat, and slightly overhang the shreddy submucous tissue which forms its base; to the latter there is adherent in places a pale brown soft substance, probably a slough stained by coagulated blood. On the left side, and placed deeply within the larynx, are two small ulcers of the mucous membrane having almost similar characters; and there are three or four others in the mucous membrane covering the upper suface of the epiglottis on the same side; the edges of the last ulcers are smoothly rounded, and their bases even and smooth. The mucous membrane of the upper opening of the larynx is slightly thickened and dull. 539

The patient, a woman, aged 44, was seized with intense pain in the throat, which prevented her swallowing; no signs of inflammation could be observed on looking into the throat. Her breathing was quite easy. She died on the fourth day.

1843. The tongue, larynx, and trachea of a child, showing ulceration of the larynx and trachea, following intubation. In the larynx there is a small round ulcer in the middle line at the base of the epiglottis and irregular superficial ulceration on each side below the vocal cords. In the anterior wall of the trachea, 3·5 cm. below the vocal cords, there is a small ulcer with swollen edges. 7545

From a child, aged 6 years and 9 months, who was admitted into U. C. H. for acute laryngitis complicating measles. Intubation of the larynx was performed, the tube being retained for 11 hours. Death occurred from broncho-pneumonia five days later. (Dr. Ringer's *Case-books*, 1896, Females, p. 634.)

Tuberculous Disease of the Larynx.

Tuberculous disease of the larynx very rarely occurs as a primary affection; it is, however, a frequent complication of pulmonary phthisis and may directly cause the fatal termination.

In the earliest stage of the disease congestion, presenting nothing characteristic, may be present, but more often there is unnatural pallor of the mucous membrane. The first distinctive sign is a swelling of the mucous membrane and submucous tissue of the ary-epiglottic folds or interarytenoid fold; the former may form two solid pyriform tumours, concealing the outline of the arytænoid cartilages and often reaching such a size as to meet in the middle line at the posterior part of the larynx (1844). This condition may be more marked on one side than the other. At the same time the epiglottis may also be swollen and rigid (1847). In the next stage of the disease numerous superficial ulcers form in the larynx. These are grey on the surface, at first rounded, but by coalescence becoming irregular in outline. On the epiglottis they occur first on the under surface (1852). On the vocal cords they soon lead to exposure of the elastic tissue (1844). These ulcers are not confined to the larynx, but may extend into the trachea (1845).

As the disease advances the larynx becomes widely affected by ulceration

(1847); the epiglottis may be completely eaten away, the vocal cords destroyed, and the whole larynx denuded of mucous membrane. In such cases the cartilages are frequently affected. The perichondrium becomes inflamed, pus forms beneath it, and the cartilage necroses and comes away. The larynx may be completely perforated, and abscesses may form in the tissues external to it (1848).

1844. A larynx, with the root of the tongue and the surrounding soft parts. The ary-epiglottic folds are œdematous. The œdema has caused a rounded swelling on each side completely concealing the outline of the arytænoid cartilages. The mucous membrane of the whole interior of the larynx and the lower part of the under surface of the epiglottis is swollen and opaque. Scattered over its surface in every part are numerous small superficial ulcers. The larger ulcers are irregular in outline, and evidently produced by the coalescence of smaller ones. On each vocal cord, about its middle, is an ulcer exposing the elastic tissue beneath. The ventricular bands are swollen, but free from ulceration. There are small ulcers in the mucous membrane of the trachea.

During life laryngoscopic examination would have shown the two rounded pyriform swellings due to the œdema over the arytænoid cartilages, the swelling of the mucous membrane within the upper part of the larynx, and the ulcers on the vocal cords.

From a man, aged 33, who died of acute phthisis. During life there was no difficulty of breathing, and no mention is made in the notes of pain in swallowing. Up to four months before death the patient had been in perfect health. At the *post mortem* examination the apex of the right lung was found to be perforated, giving rise to pyo-pneumothorax of the same side. The lower lobes of both lungs were studded with grey granulations. Nothing else of importance was noted except grey granulations in the liver.

1845. A larynx and trachea, with part of the right lung, &c. The mucous membrane of the larynx below the vocal cords, of the trachea for its whole extent, and of part of the left bronchus is perforated with small, sharply defined, oval and circular ulcers, which in places have coalesced and form considerably larger ones, the edges of which are irregular or dentate. The ulcers merge in size to the natural minute openings of the mucous glands. The mucous membrane between the ulcers is for the most part healthy, but within the larynx it is thicker and less translucent than natural; from the left side of the larynx it has been almost wholly removed by ulceration. The epiglottis is healthy. The vocal cords are rounded and thickened, but not ulcerated. The lymphatic glands lying on the trachea and around the bronchi are considerably enlarged; on the lower part of the trachea the enlarged glands form a lobulated oval mass, which measures about 5 cm. in the vertical direction. Sections have been made through a similar mass on each bronchus; the substance of these masses is caseous. 1594

1846. The larynx, with the tongue, part of the trachea, and adjoining parts from a man who died of phthisis. The epiglottis is slightly irregular in shape, its right side being considerably thickened. The right ary-epiglottic fold forms a thickened ridge, ending in a rounded swelling over the arytænoid cartilage; the left fold is much less swollen, but the rounded swelling over the arytænoid cartilage is clearly marked. The mucous membrane covering the upper surface of the epiglottis is healthy; that on its under surface and between it and the vocal cords is extensively ulcerated, especially in the middle line. Both vocal cords are thickened, rounded, and superficially ulcerated, chiefly at the anterior part. In the lower part of the larynx the orifices of the glands are abnormally distinct. In the trachea are a few superficial circular ulcers. The incision in the mucous membrane resembling a tracheotomy wound has been made accidentally in removing the specimen.

From a man, aged 40, admitted into U. C. H., under the care of Dr. Wilson Fox, August 10, 1878. There was no history of tubercle or syphilis. The illness began six months before admission with dyspnœa attributed to breathing the fumes of hydrochloric acid during work in a dye factory. The man was ill for a month and then resumed work. Two months before admission he was again attacked in the same way and remained ill until he came into the hospital. He had lost much flesh and was very weak. There was great anæmia. There was some dyspnœa. He gradually got weaker and died after being three months in the hospital. At the *post mortem* examination extensive tuberculous disease of both lungs was found. (Dr. Wilson Fox's *Case-books*, Males, vol. ii, 1878, p. 215.)

1847. A larynx and part of the trachea. The epiglottis is slightly swollen and rigid, the ary-epiglottic folds are swollen and infiltrated, and the mucous membrane covering the arytænoid cartilages forms two rounded pyriform swellings. The mucous membrane above the vocal cords is deeply ulcerated, so as to present two irregular surfaces almost symmetrical in shape. Both surfaces of the epiglottis are superficially ulcerated. On the left side the elastic tissue of the vocal cord is exposed; on the right side the cord is superficially ulcerated. Below the vocal cords the mucous membrane is superficially ulcerated, some of the larger ulcers having a crenate margin, as if formed by the coalescence of smaller ones. 1609

During life the rigid epiglottis and the swollen ary-epiglottic folds would have rendered it very difficult to obtain a view of the ulcerated surfaces with the laryngoscope.

From a man, aged 36. The disease led to dysphagia, especially of liquids, which regurgitated through the nose; the voice was much impaired and ultimately lost. There was profuse purulent expectoration and difficulty of breathing; emaciation and hectic fever. The disease was of two years' duration. There had been considerable œdema of the glottis and lower surface of the epiglottis, but this was reduced by repeated scarification.

1848. A larynx and trachea. The epiglottis is extensively ulcerated. The ary-epiglottic folds are infiltrated and thickened, and that on the right side deeply notched by ulceration. Between the ary-epiglottic folds and the vocal cords the ulceration has extended deeply into the ventricles. On the left side the larynx is perforated immediately above the upper border of the cricoid cartilage by a small aperture, leading probably into the cavity of an abscess which has been opened in preparing the specimen. The vocal cords are thickened and superficially ulcerated. From this level downwards for 5 cm. the mucous membrane of the larynx and trachea is swollen and everywhere superficially ulcerated. In the upper part of the trachea is the opening resulting from tracheotomy, and about 1 cm. below the opening two of the cartilaginous rings of the trachea have been exposed for a short distance in the middle line by ulceration. 3371

The ulceration below the tracheotomy wound is due to the tube being bent at too great a curve and so pressing on the trachea.

1849. A larynx, with the upper end of the trachea. The mucous membrane of the larynx above the vocal cords has for the most part been destroyed, the surfaces of the ulcerated areas being very uneven and nodulated. Both surfaces of the epiglottis are extensively ulcerated and the border irregularly notched. The ary-epiglottic folds have been destroyed. The right vocal cord is swollen and superficially ulcerated; the left is less swollen but is ulcerated in its posterior half. For a distance of 2 cm. below the vocal cords the mucous membrane is superficially ulcerated, and there are numerous small ulcers in the trachea. 1607

From a man, aged 34, who suffered from laryngeal symptoms for many years. He finally sank, and died greatly emaciated. The lungs were extensively tuberculous.

1850. A larynx and trachea. The mucous membrane of the larynx above the vocal cords has been completely destroyed by tuberculous ulceration, which has destroyed also a considerable part of the right ary-epiglottic fold and extended forwards towards the tonsil and the root of the tongue. The left vocal cord is also destroyed. The mucous membrane of the epiglottis is deeply ulcerated, and its free edge is slightly irregular in outline. The floor of the ulcer is coarsely granular and very irregular. An incision has been made into the ulcer on the left side to show the depth to which the infiltration extends. The mucous membrane of the larynx and trachea for about 5 cm. below the vocal cords is fenestrated by innumerable superficial ulcers. 5352

The patient, a woman, 34 years of age, died a few hours after admission. When seen she had quite lost her voice and could not swallow fluids. After death both lungs were found firmly adherent and filled with miliary tubercles. The bronchial glands were swollen with tuberculous deposit; kidneys much sacculated; liver and spleen healthy.

1851. A larynx, together with the tongue and part of the trachea. The interior of the larynx is extensively ulcerated. The ulceration involves the under surface of the epiglottis, the left edge of which has been destroyed, the ulcerated surface being coarsely granular. The right border and upper surface of the epiglottis are swollen and infiltrated. The left wall of the larynx, between the position of the ary-epiglottic fold and the vocal cord, presents a nodular ulcerated surface, the cord, except in its anterior part, being destroyed. The right ary-epiglottic fold is less extensively destroyed than the left and the right vocal cord is intact. Below the cords for a distance of 2 cm. the mucous membrane is marked by small superficial ulcers. 5031

1852. A larynx and part of the trachea. The upper surface and borders of the epiglottis are normal; in its lower part the under surface presents numerous superficial ulcers, three of which, much larger than the rest, are situated one on each side of and one below the cushion. The mucous membrane covering each arytænoid cartilage is slightly swollen. The ventricular bands and vocal cords are intact. Below the cords the mucous membrane of the larynx and of the part of the trachea preserved in the specimen is extensively ulcerated. In the trachea the ulceration has followed the line of the cartilaginous rings, which are thus extensively exposed, the long, narrow, transversely disposed ulcers being separated by narrow strips of irregular, infiltrated, mucous membrane. 5862

Syphilitic Disease of the Larynx.

In the early stages of secondary syphilis erythematous redness and congestion are of frequent occurrence, but these of course cannot be illustrated by museum specimens. During the later secondary period condylomata and mucous tubercles are not uncommon. They form greyish elevations, sometimes smooth, sometimes wrinkled, and surrounded by a red zone. Their most common situation is about the epiglottis and the interarytænoid commissure. Superficial ulcerations are occasionally met with in the same situations. Mucous tubercles are in rare cases seen in congenital syphilis.

In the tertiary stage of syphilis gummata, uniform infiltrations, deep ulcerations, and cicatricial contractions are the characteristic changes. Gummata are not common. They form yellowish, irregular, rounded swellings, sometimes reaching the size of a pea, situated in the submucous tissue, most commonly in the epiglottis or in the parts below the vocal cords. If the gumma sloughs it causes a deep ulcer, the base of which is at first formed by a yellow tenacious slough. Deep ulcerations may arise independently of softening gummata (1856). These ulcers are often solitary, never numerous; they are irregular and serpiginous in form, with abrupt hard edges and a grey and irregular floor. They are most common on the epiglottis and the ary-epiglottic folds, and tend to spread from the peripheral parts of the larynx towards the centre (1854). On the epiglottis they usually commence on the upper surface (1853). Syphilitic ulcers frequently cause very widely spread destruction of the epiglottis and ary-epiglottic folds. They are accompanied by a solid inflammatory swelling rather than by œdema (1856). The vocal cords may be implicated by the extension of the ulceration; and in the earlier stages wart-like excrescences may form on them.

Syphilitic disease of the larynx occasionally leads to necrosis of the cartilages. The arytænoid cartilages suffer most frequently, the cricoid occasionally, and the thyroid very rarely. Syphilitic ulceration of the trachea is extremely uucommon (1855).

When deep syphilitic ulcers heal, the contraction of the scars produces great deformity, especially of the epiglottis, and sometimes such narrowing of the glottis as to necessitate tracheotomy (1860).

In specimens of syphilitic disease of the larynx, scarring may sometimes be observed in the pillars of the fauces and tonsils.

1853. A larynx, with the adjoining portion of the trachea. The epiglottis, the ary-epiglottic folds, and the mucous membrane covering the arytænoid cartilages are thickened and indurated. The epiglottis has a rigid appearance, and is fixed over the opening of the glottis like a cowl, its normal curves being replaced by a single one with its concavity downwards. The free edge of the epiglottis and both its surfaces are superficially ulcerated. 3682

The affection is the result of syphilis. During life the opening of the glottis would have been seen with great difficulty on account of the altered position and rigid state of the epiglottis.

1854. A larynx, with the posterior part of the tongue, &c. On each side of the epiglottis a semilunar piece of the mucous membrane and corresponding part of the cartilage have been destroyed by syphilitic ulceration. The edges of the ulcers, which are almost symmetrical, are quite sharp and cleanly cut, and the ulcerated edge of the mucous membrane is readily distinguishable from that of the cartilage. The mucous membrane of the ventricular bands and vocal cords is thickened. Below the vocal cords and in the interarytænoid commissure the surface of the mucous membrane is rendered uneven by flattened elevations, in some parts almost warty in appearance; these are most marked on the right side. 5048

(Sir J. Russell Reynolds's *Case-books*, Males, 1864–65, Brodrick.)

1855. The lower part of a trachea and the bifurcation, together with part of the aortic arch, which is firmly adherent to it. At a level of 5 cm. above the bifurcation the lumen of the trachea is almost completely obliterated by a dense fibrous stricture. At the point of stricture a thick fibrous ridge projects into the narrowed lumen from the anterior wall. In the part of the trachea above the stricture the mucous membrane has been entirely destroyed by ulceration. Below the stricture the mucous membrane of the trachea and main bronchi is irregularly thickened and in parts trabeculated as if by ulceration. In the left wall of the trachea, 1·5 cm. below the stricture, is a deeply excavated ulcer 7 mm. in diameter, from which a minute opening leads through the adherent anterior wall of the aorta. 6954

1856. A larynx, with the adjoining part of the trachea and the base of the tongue. Over both surfaces of the epiglottis and the contiguous part of the root of the tongue the mucous membrane is ulcerated and hangs in long shreds from the surface. The left ary-epiglottic fold is almost destroyed. The mucous membrane covering the arytænoid cartilages is swollen. The vocal cords are quite healthy. 2132

The disease is described in the MS. Catalogue as "Gangrenous Inflammation of the Epiglottis." It is most probably a rapidly spreading syphilitic ulceration.

1857. A larynx, with parts of the trachea and œsophagus. The mucous membrane of the larynx and that covering the back of the cricoid cartilage, and forming the ary-epiglottic folds, is considerably swollen by inflammatory effusion into the submucous tissue, the upper opening of the larynx being much diminished in size. The mucous membrane of the ary-epiglottic folds is in parts ulcerated; the fold of the right side is for part of its extent completely obliterated, having become continuous with the wall of the pharynx in the healing of an ulcer. The trachea has been opened by tracheotomy immediately below the isthmus of the thyroid gland. 2666

From a woman, aged 24. The œdema of the glottis, from which she died, was preceded for some weeks by syphilitic inflammation and ulceration of the throat. Tracheotomy was performed just before death.

Necrosis of the Cartilages of the Larynx.

Necrosis of the cartilages following perichondritis, with suppuration, may occur as the result of injury, tuberculous disease, syphilis (1860), or cancer. It also may occur after typhoid fever, and occasionally without any recognisable cause. The arytænoid and cricoid cartilages suffer most frequently, the thyroid comparatively rarely. The necrosed fragment may have been ossified or calcified before it was affected by the disease which caused its death (1861). The fragment may be extruded from an ulcer in the neck, but is more commonly coughed up (1861). If the necrosis has resulted from any cause other than tuberculous disease or cancer the patient frequently recovers; but great contraction of the larynx may follow, necessitating the permanent use of a tracheotomy-tube.

1858. A tongue, with the larynx, trachea, pharynx, and part of the œsophagus. An ossified portion of the posterior part of the right ala of the thyroid cartilage is necrosed and almost completely separated from the rest. The necrosed portion projects into the cavity of an abscess, which reaches below as far as the right lobe of the thyroid gland, and backwards by each side of the necrosed portion of the thyroid cartilage into the pharynx, which is perforated in three closely adjacent situations; the edges of the openings are smoothly rounded. The upper end of the œsophagus is diminished in size; its mucous membrane is thickened and superficially ulcerated.

In the anterior wall of the œsophagus, on a level with the bifurcation of the trachea, is a small traction diverticulum which is connected with an indurated gland lying above the left bronchus. 2264

1859. A larynx with part of the trachea. The cartilages of the larynx have, in great part, ossified. Of the left ala of the thyroid cartilage a considerable portion has undergone necrosis, and is, in part, separated from the rest; the sequestrum lies bare in the space between the ary-epiglottic fold and the lateral wall of the pharynx. Lying on the inner side of the sequestrum is a mass of loose flocculent tissue which almost fills the space just noticed—probably granulation-tissue and sloughing mucous membrane. The mucous membrane of the ventricular bands and vocal cords is thickened. 529

1860. The larynx and trachea of an adult, in whom tracheotomy was performed. The opening is about 4 cm. in length; its upper part corresponds with the crico-thyroid membrane and cricoid cartilage, and is smoothly cicatrized; the lower part of the aperture corresponds with the three upper rings of the trachea, and is of recent date, the edges being still covered with granulations. The calcified rings of the trachea are bare, and project on each side into the wound. The isthmus of the thyroid body has been divided in the operation. The interior of the larynx has been narrowed and rendered irregular by the contraction of cicatrices. In the right ventricle there is impacted a sequestrum of ossified cricoid cartilage (see 1861). 3629

1861. Three sequestra of ossified cricoid cartilage from the same case. The largest, somewhat triangular in shape and marked with the facet for the left arytænoid cartilage, was expelled after tracheotomy. The two smaller pieces lay in the left bronchus.

From a man who had been treated for syphilis with mercury. Two years later, in August 1845, tracheotomy was performed on account of difficulty in breathing, and a tube retained. In 1846, there was offensive purulent expectoration, and on account of difficulty in breathing Mr. Liston enlarged the opening in the trachea by dividing two or three of the ossified rings with bone forceps, and introduced a larger tube. Later in the year the respiration again became troublesome; the tracheotomy-opening was again enlarged and a piece of ossified cricoid cartilage was ejected by coughing through it. After death the left lung was found partly collapsed and adherent; the lower part was inflamed and contained pus. In the left bronchus, two inches from the bifurcation of the trachea, was a small sequestrum impacted in the mucous membrane, which was thickened and injected.

SIMPLE TUMOURS OF THE LARYNX.

The following simple tumours occur in the larynx:—

1. *Papillomata.*—These are by far the most common. They spring most frequently from the vocal cords, but they may develop in the ventricles or elsewhere. They form cauliflower-like excrescences, either pedunculated or sessile. When sessile the base has considerable tendency to spread, and the tumours are frequently multiple. Papillomata of the larynx may occur at any age, and are not uncommon in early life (1862–1865).

2. *Fibromata.*—These spring from the submucous tissue in the neighbourhood of the vocal cords. They are smooth or smoothly lobulated on the surface; their average size is about that of a pea. They may occur at almost any age, but are very rare in children.

3. *Cystic tumours* are very rare. They spring from the epiglottis or the ventricles and are probably formed by retention of the secretion of some of the glands of the larynx.

4. *Myxomata*, *Lipomata*, and *Angiomata* are of extreme rarity. *Ecchondroses* or cartilaginous outgrowths from the cartilages of the larynx have also been met with.

1862. The larynx and trachea of a child, laid open from behind to expose a delicate papillary growth, about 9 mm. in diameter, attached to the posterior part of the right vocal cord; the growth projects inwards, so as almost to fill the glottis. The mucous membrane of the larynx is throughout natural in appearance. 4765

1863. The larynx and part of the trachea of a child. The rima glottidis is occupied by papillomatous growths. The largest growth, which has a vertical measurement of 13 mm., arises from the anterior part of the right vocal cord; it projects chiefly downwards, but also outwards into the ventricle; it is composed of small rounded processes. The remaining part of the right vocal cord, as well as the left vocal cord and the ventricular bands in their whole length, are beset with minute, sessile, papillomatous outgrowths, giving to the parts a coarse warty appearance. 6142

The symptoms were those of laryngeal obstruction. Death occurred during the performance of tracheotomy.

1864. The larynx of a child. The mucous membrane of the posterior surface of the epiglottis, and the anterior and lateral walls of the larynx, as far backwards as the arytænoid cartilages, and as low as the upper border of the cricoid cartilage, is thickly covered with clusters of delicate, sessile, papillary growths, which completely cover the vocal cords. The growths are somewhat more extensive on the right than on the left side. The rest of the mucous membrane appears quite healthy. 4779

From a girl, 4 years old, who died suffocated. Her respiration had been stridulous for more than two years, and during this time she had been always subject to paroxysmal dyspnœa. The lungs were everywhere adherent to the chest-walls, and markedly emphysematous; the liver also was adherent to the diaphragm and abdominal wall. The tonsils were very large.

1865. The larynx, with part of the trachea, of a young woman. From the mucous membrane of the vocal cord of the left side there has grown an oval, pedunculated, cauliflower-like excrescence, commensurate in length with the cord, and reaching downwards to the middle of the cricoid cartilage; its upper edge is straight, and scarcely projects above the vocal cord to which it is attached. The whole mass is about the size of a large filbert. From the anterior part of the right vocal cord, also, a similar but much smaller papillated tumour has grown; and a third is attached to the mucous membrane in the middle line below the level of the other two.

The mucous membrane of the vocal cord on the right side is slightly thickened and minutely shreddy or villous, as if superficially ulcerated. 1265

From the body of a young woman, in whom the tumour had existed for some time, producing a slight cough. The tumour at length caused suffocation.

Malignant Tumours of the Larynx.

Sarcoma of the larynx is very rare; it usually assumes a papillary form and grows from the neighbourhood of the vocal cords.

Carcinoma of the larynx may occur as a primary affection, or the larynx may be invaded by a growth originating in the pharynx. Carcinoma of the larynx is met with in intrinsic and extrinsic forms; in the former the disease originates within the larynx, usually from the ventricular bands or vocal cords; in the extrinsic form the disease begins in the parts around the upper aperture of the larynx, such as the epiglottis and ary-epiglottic folds. The extrinsic form pursues a much more malignant course than the intrinsic, and is usually complicated at an early stage by glandular infection.

Carcinoma of the larynx usually occurs as an irregular fungating growth, which ulcerates early, the ulcer presenting the rugged surface and everted edges characteristic of malignant disease. The growth is always of the squamous-cell variety (1866).

1866. A larynx with the base of the tongue, the former having been laid open to display an extensive ulcerated carcinomatous growth. The epiglottis has been destroyed by the growth, with the exception of a narrow strip of the upper border, which remains attached to the left ary-epiglottic fold. From the original position of the attachment of the epiglottis in front, and laterally from the ary-epiglottic folds the growth extends downwards, in the whole circumference of the larynx, to the level of the vocal cords, which are involved on their ventricular aspects. The whole growth forms one large deeply excavated ulcer, from the surface of which, especially in the left side, irregular masses of tumour-substance project. 5053

INJURIES OF THE HEART AND LUNGS.

1867. Part of a heart, with the great vessels and the left lung. The substance of the left ventricle has been penetrated by a bullet, which has afterwards traversed the lung. The right side of the heart and the septum have been cut away, in order to show that the bullet has not entered the cavity. The aperture of exit in the pulmonic pleura is almost linear and measures nearly 2 cm. in diameter. There is a rounded swelling in the lung around the aperture, showing that the air-vesicles beneath are filled with extravasated blood.

1868. The right lung of a child, presenting two lacerations. The more extensive laceration is situated at the bottom of the fissure between the upper and middle lobes; the second smaller laceration involves the diaphragmatic surface. 6866

From a girl, aged 9 years, who died 4 hours after being run over by an omnibus. There was an effusion of blood in the right pleura. The ruptured liver (No. 1561) and the ruptured right kidney (No. 1872) from the same case are also preserved.

1869. A piece of necrotic lung, 6·5 cm. in length, which was discharged from an empyema following an injury of the chest. 7942

From a man, who was injured in a buffer-accident. He was admitted into U. C. H. with surgical emphysema, followed by hæmothorax, which was aspirated. An empyema developed and was opened; the piece of lung preserved in the specimen was discharged a week later.

DERMOID CYST OF CHEST.

1870. Three fibrous masses, which were removed by operation from the inner surface of a dermoid cyst of the right side of the chest. Each mass is covered with skin, except over the surface through which it was removed, and from the skin large numbers of hairs project. The largest mass is 7·5 cm. in length; its attached extremity is cylindrical, the free extremity being much larger and very irregular in shape.

From a woman, aged 29, in whom the symptoms began with an attack of acute right pleurisy with effusion in May 1879; after some time this was followed by right-sided empyema, which ruptured into a bronchus. In June 1887, there being still cough and expectoration, and dulness in the lower part of the right axilla, the right side of the chest was explored and pus detected at a depth of 3 inches in the 6th intercostal space. Part of a rib was removed and a small deep-seated abscess-cavity opened. After the operation the patient coughed up two hairs, and others escaped from the drainage-tube. At subsequent operations a large mass of hairs and fatty material, together with the fibrous masses preserved in the specimen, were removed from the cavity in the chest, which proved to be much larger than was at first thought. The cavity was lined with skin, which was intimately connected with the surfaces of the lung and diaphragm. In 1889 it was still necessary to retain a tube in the opening into the cavity on account of the continued presence of a watery discharge, mixed with fatty material. (Mr. Godlee, Med.-Chir. Trans. vol. lxxii, 1889, p. 317.)

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